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CONCRETE

VOLUME XII

JANUARY, 1912

NUMBER 1



CHICAGO "AA"

1,250,000 Barrels Annually

HIGHEST QUALITY

"The best that can be made"

Always reliable, absolutely uniform and fully guaranteed to meet the requirements of the Standard Specifications

FACTORY AT OGLESBY, ILL.

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No. 108 LaSALLE ST. CHICAGO, ILLINOIS

ALPHA PORTLAND CEMENT

The Recognized Standard American Brand

A strictly straight Portland, which, for uniformity and general excellence, CANNOT BE EXCELLED

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The universal use of concrete has compelled study of its every phase. Users in general are now inquiring into the dangerous element of magnesia in Portland cement. The output of most mills runs high in this element, whereas Superior runs less than 1% Magnesia. Then it is dust-fine, giving a combination that means economy and endurance. Superior is a true Portland cement. Ask for our free magnesia literature.

Union Trust Building, Cincinnati, Ohio.

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Superior Portland Cement Co.

"LEHIGH" PORTLAND CEMENT

Recommended for high-class engineering work. High tensile strength. Finely ground, light and uniform in color.

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You have a good idea

Tell the Editors of **CONCRETE**

Detroit, Mich.

CONCRETE

CONCRETE PUBLISHING COMPANY

TABLE OF CONTENTS, PAGE 27 DETROIT, MICH. ADVERTISERS' INDEX, PAGE 121

ONE DOLLAR A YEAR

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PORTLAND
CEMENT
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Concrete Bridge, Rochester, N. Y.
Medusa White Portland Cement Used.

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Medusa Products

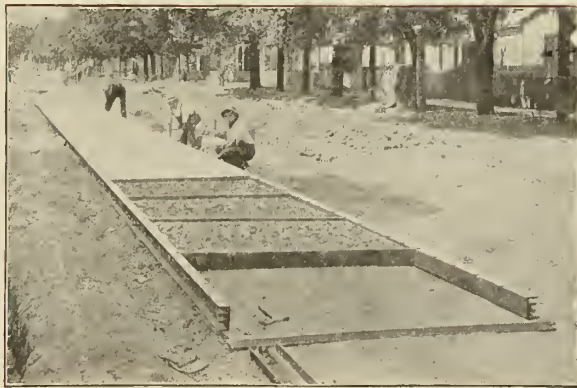
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Waterproofing

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Free Illustrated booklets and samples sent on request

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Agents wanted in all parts of the country to sell Blaw Sidewalk, Curb and Curb and Gutter Forms.

Blaw Forms are designed from the contractor's standpoint. They are light, rigid, quickly and easily handled, and will last a lifetime. The design is simple and the cost low.

The experience of The Pioneer Steel Form Builders at your service.

Blaw Forms have been used on over 3500 Contracts

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Shaft Forms
Pipe Molds

Wall Forms
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Large Span Arch Ribs

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Write for information, stating your requirements.

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General Offices, Westinghouse Bldg., Pittsburgh, Pa.

New York—165 Broadway.

Chicago—917 Ashland Block.

The Greatest Machine Ever Devised for the Cold Mixing of Concrete and the Hot Mixing of Asphalt and Rock

You can lay a better asphalt pavement at less cost
by using

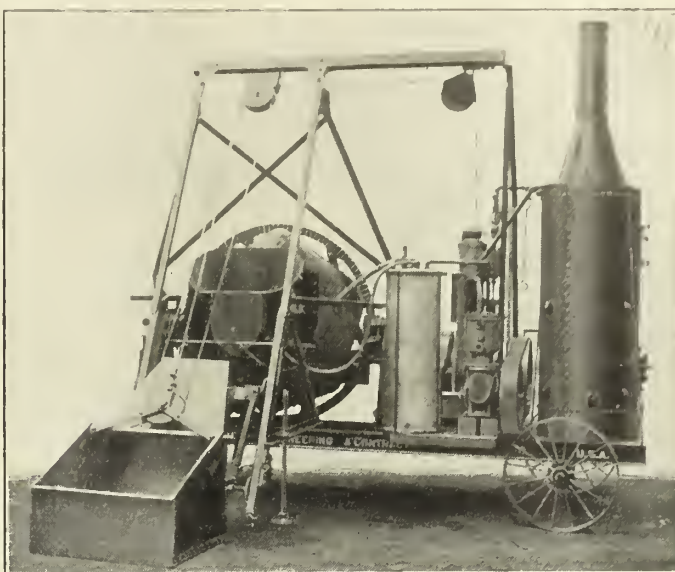
The Chicago Improved Cube Mixer with Austin Attachment for Hot Mixing

Use it first without the heat turned on, for the concrete foundation. It makes the most uniform and thorough mix of concrete in less time, with less labor, with greater convenience, than any other known method.

Starting with the best foundation of concrete it is possible to secure, you are ready for the most advanced idea that has developed in years for the laying of the topping. Instead of laying the crushed stone on the concrete and pouring the asphalt over it—a crude, expensive and inefficient operation—put the stone in the same cube mixer that mixes the concrete, turn on the heating attachment, dry the stone, then put in the asphalt and mix the two under proper temperature. The stone will come out smeared all over evenly with asphalt so that it will bond together in a hard, unified mass, with extraordinary wear-resisting powers.

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West. Pa. Representative: J. S. Beckwith, Pittsburg, 108 Parkway, N. S.

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THE LOW-DOWN CONCRETE MIXER HAS SEVERAL FEATURES NOT FOUND IN
ANY OTHER MACHINE.

With the Low Down Hoppers one man can do the work of two, as he is not required to lift the sand, stone and cement so high.

The Chain Elevator acts as a force feed, forcing the sand, stone and cement, wet or dry, into the Mixing Trough.

The Gates at the end of the hoppers are adjustable up or down to regulate the quantity, and the Mixing Trough runs from twelve to eighteen inches longer than regular, which gives a more thorough mix.

We do not have any frictional sliding measuring device to wear out when coming into contact with sand and cement.

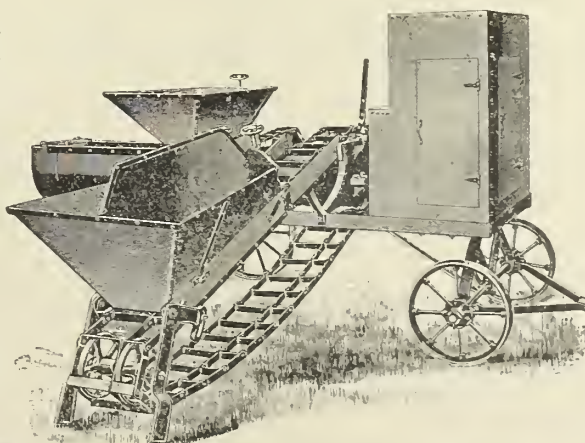
The Mixing Trough and Paddles are easily cleaned because they are not covered up with hoppers.

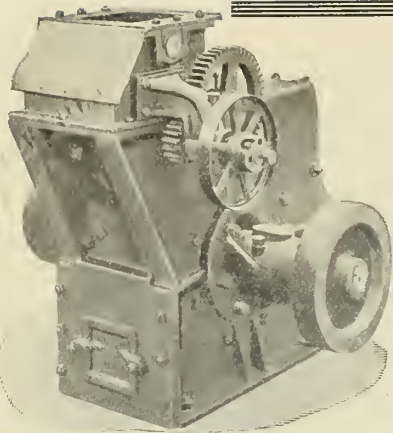
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Write us about our special proposition.

Elite Manufacturing Co.

No. 600 Ohio St., Ashland, O.





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The Pulverator is a grinding machine developed along advanced lines by Allis-Chalmers Company to meet the need for a compact, highly efficient preliminary grinder for raw material.

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Bulletin 1450.

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Peerless Rubber Mfg. Co.

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Note the "Swing up" 30' (15 plates) raised in 10 minutes. Simple—Rigid—Indestructible.

Any man can put it up. Adjustable to any dimensions and any thickness.

No Bolts, No Nuts, No Wires. All wedge connections, locked and unlocked by a stroke of the hammer.

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GENERAL MANAGER

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CRUSHING**

ROLLS

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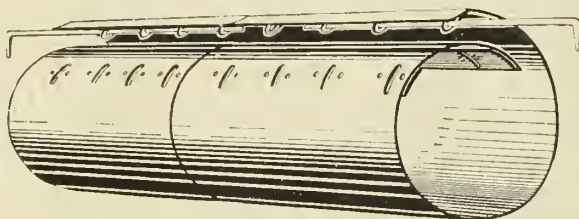
His book will be of especial value to American manufacturers, in that it contains a host of valuable suggestions on processes and methods. He takes up both the wet processes and the dry. He devotes some valuable chapters to kilns, and has some very useful material on the treatment of the clinker and the finished cement. His work is not in the least controversial or dogmatic, but aims to set forth data that will be of actual working value to the manufacturer.

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If you have any culvert jobs in prospect, get the Fish Steel Mold for Concrete Culverts and see how much money it saves you. It makes culverts from 13 to 48 inches in diameter and 16, 18, 20 or 24 feet long, barrel and wings monolithic. Hundreds of contractors and highway officials use this mold. We guarantee that it will satisfy you and we send it to you on approval. You can use it, give it a thorough trial and accept it or send it back. **WE TAKE ALL THE RISK BECAUSE WE KNOW THE MOLD WILL MAKE GOOD.**

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Write for our circular matter before you figure on your culvert jobs. The Fish Molds will save money for you. Write tonight, while you think of it.

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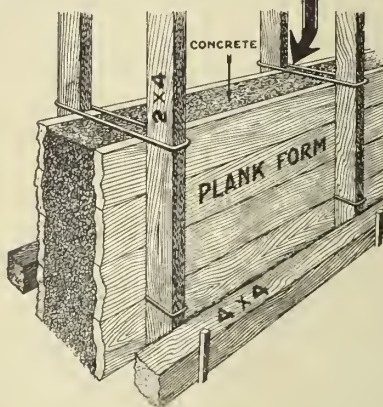
Our circulars tell how to make money building concrete culverts

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Androck Concrete Wall Ties

SAVE TIME, LABOR AND LUMBER

Start your forms as shown in the lower picture, staking the horizontal pieces at the bottom. As you work up, slip "Androck" Ties over the studs. No bulging, no cracks, no nails, no clamps. A solid, motor-tight form, in perfect alignment. No "fins" to trim from the completed wall.



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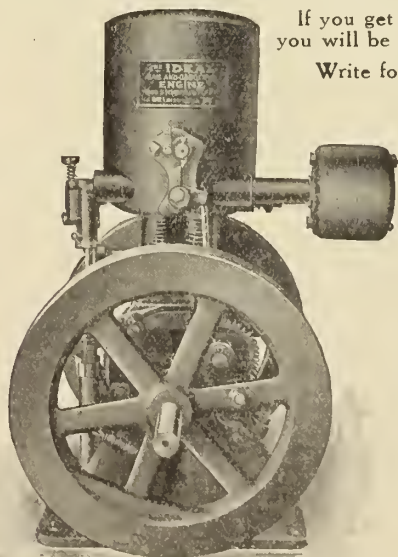
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Wire & Iron
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The Ideal engine is light weight for power delivered, workmanship and material are first class and the prices reasonable.

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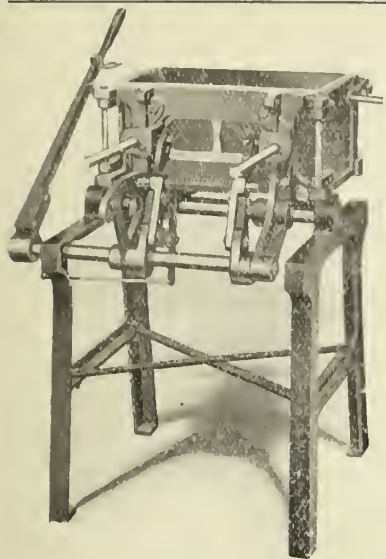
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By Using the

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*Has the Dollar Value and
Efficiency Value*

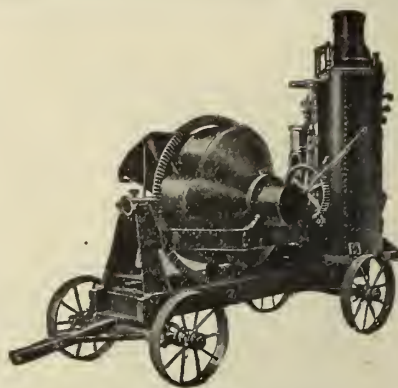
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"Chain Belt"
will be a bulletin
of SERVICE

It will contain advanced and practical ideas for everyone connected with the concrete business. It will describe recent constructions of concrete buildings, aqueducts, bridges, water towers, tanks, etc. It will contain articles describing just how Concrete Mixers are made. It will contain a page of data that is interesting and valuable to contractors.

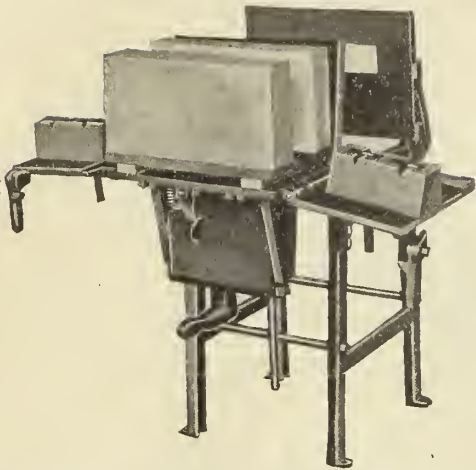
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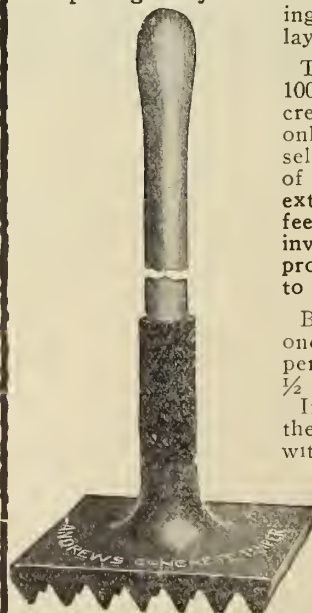
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and Saves You \$2 Per 100 Sq. Feet**

It is a real money-making, time-saving necessity for horizontal concrete work. By its use the coarse aggregates are forced into the body of the concrete, which brings the mortar to the top for finish—thus completing the job at one operation. Obviates laying base first and a finish layer afterwards.



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Holding your Moulds, Curbing, General Block Concrete Work.

Ask for Catalog No. 137



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Economy Double Headed Nail

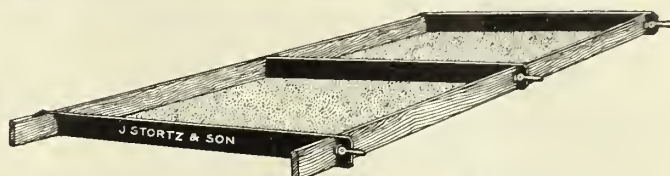
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Joist Hanger

Specially Adaptable for

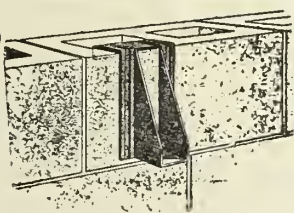
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Pipes and Registers Extra

We will deliver a complete heating equipment at your station at factory prices and wait for our pay while you test it during 60 days of winter weather.

The entire outfit must satisfy you or you pay nothing. Isn't this worth looking into? Could we offer such liberal terms if we didn't know that the Hess Furnace excels in service, simplicity, efficiency, economy.

We are makers—not dealers—and will save you all middlemen's profits. No room for more details here. Write today for free 48-page booklet which tells all about it. Your name and address on a post card is sufficient.

HESS, 902 Tacoma Bldg., Chicago

Makers of Hess Sanitary Steel Lockers or Medicine Cabinets for Bath Rooms. Illustrated circular free.



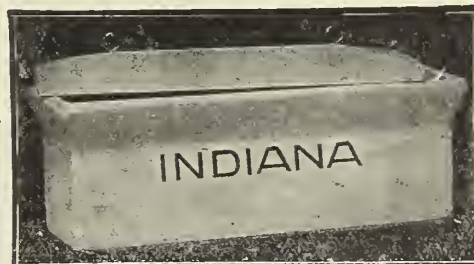
CHASE CARS

for handling
Block, Brick,
Tile,
Sand, Gravel,
Stone, etc.

WE MANUFACTURE A COMPLETE LINE

of cars for all purposes, in the plant or on the construction job. Write for Catalog.

The Chase Foundry & Mfg. Co. Columbus, O.



WE
SELL
BURIAL
VAULT
MOLDS

NO TERRITORIAL RIGHTS OR ROYALTIES

The "Indiana" mold is adjustable for nine sizes. With it you can make a full sized two piece vault at factory cost as follows: 5 sacks cement, \$1.75; 1/2 yd. gravel, 50c; reinforcing and cover rings, 40c; labor, \$2.00; total, \$4.65. Such a vault sells for \$50.00.

Will you write for our free booklet about the vault business?

INDIANA CONCRETE BURIAL VAULT CO.

780 Lemcke Bldg.

INDIANAPOLIS, IND.

These Buildings
and Millions of Dollars' Worth
of Other Buildings
Are Finished With
Glidden's
Advanced Finishes.

*Location of Buildings, Dem-
onstrations and Specifications,
gratis, upon request.*

The Glidden Varnish Co.

Factories

Cleveland, U. S. A. Toronto, Can.

Branch Warehouses

New York

Chicago

London

The Recognized Standards—used in the big work

GLIDDEN'S CONCRETE FLOOR DRESSING for floors—prevents dusting. GLIDDEN'S LIQUID RUBBER—waterproofs basements.
GLIDDEN'S LIQUID CEMENT for cement stucco—dampproofs—decorates. GLIDDEN'S ACIDPROOF COATING—prevents electrolysis and corrosion
GLIDDEN'S WATERPROOF FLAT FINISHES—sanitary, washable wall of iron and steel.
GLIDDEN'S FRENCH CAEN STONE FINISH—reproduces French Caen Stone treatments.

At your request we will make a gratis practical demonstration of these materials upon such work as you may authorize

In writing Advertisers please mention CONCRETE.

WHITE CEMENT	SOMETHING NEW	WHITE SAND
 WATER PROOF AND READY MIXED FOR FACING CON- CRETE ✓ EXTERIOR PLASTER 150 LB. BAGS	SPECIAL PRICES IN MIXED CARLOADS TO DEALERS AND LARGE USERS	 WITH GREY CEMENT INSURES CLEAN, SHARP CASTINGS OF ATTRACTIVE COLOR 150 LB. BAGS
GROUND MICA	GUARANTEED WATERPROOFING	CRUSHED GRANITE
UNITED STATES SILICA COMPANY, 400 Peoples Gas Bldg., CHICAGO.		



“DIAMOND N”

EXPANSION BOLTS

Make a positively secure fastening to walls of brick, stone or concrete.

Greatest expansion occurs at inner end, preventing cracking surface of wall.

Corrugated ribs increase holding power, longitudinal ribs prevent shields turning when screw is inserted.

*They Hold as Long
as the Wall Lasts.*

Diamond Expansion Bolt Co.
90 West St., New York.

The Westmoreland Chemical & Color Company's

OXIDES of IRON

- ☐ Have greater coloring capacity than any other red pigments—
- ☐ Are being used extensively for cement, concrete and brick work—
- ☐ If you use colors **DON'T FAIL to WRITE US** for samples and prices.

925 Chestnut Street, Philadelphia,
or 92 William St., New York.

Prevents Freezing
in

Concrete

“Solvay” Calcium Chloride

General Selling Agents

Carbondale Calcium Co.

Ask for Bulletins Nos. 16, 28 and 30.
CARBONDALE, PA.

Power for Your Concrete Plant

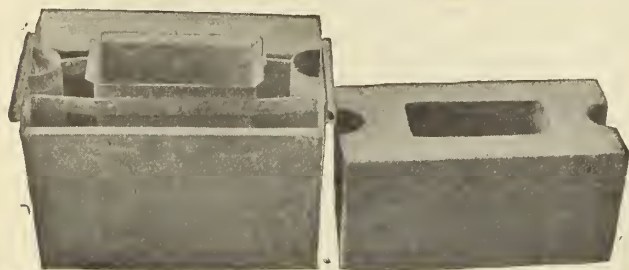
You can save on the cost of every block, brick, tile or other concrete product by using power in your plant.

THE FOSS GASOLINE ENGINE

is built for service. It is light and simple, consumes little fuel and is dependable. You can buy a cheaper engine, but not a better one for the money. A FOSS Engine will pay for itself in reduced payroll. Ask for catalog.

Foss Gasoline Engine Company

755-757 Portage St., Kalamazoo, Mich.



Make Your Blocks by the Wet Process

Pour Material In Machine and Remove Machine from Block at once.

Blocks made by the poured process require no tamping, no waterproofing, and they cure quickly. They are better blocks, sell quicker with greater profits for the manufacturer.

Investigate the Merits of the Wet Process Block Machine

This machine is built to wear. It is simple, compact and low priced. One man can make 200 blocks per day with it.

Write for Circular and Price TODAY.

Georgetown Block Machine Company
GEORGETOWN, ILLINOIS.



The Finger Ring Levels

The ideal tool for setting forms for concrete, laying cement block, raising leads and corners and topping out flues. These are only a few of the many uses the mechanic has for this level.

Buy one today and be convinced of the real merits and utility of this tool.

If not sold by your hardware dealer, write to us, giving name of your dealer, and get our beautiful illustrated booklet of "How Jack Finnigan Saved His Job."

THE KOKOMO LEVEL CO.

Kokomo, Ind.

General European Agents:
Lindenthal & Co., Berlin, Germany
Agents Great Britain:
The (U. K.) Winget Concrete Machine Co.,
Newcastle-on-Tyne, England
Asiatic Agents:
Joseph Edward & Co.,
Victoria Road,
Karachi, India.

In ordering, please give measurement of finger



Level and
Plumb
Combined

Cement Pipe and Tile

By E. S. HANSON

NEW EDITION

READY JAN. 1st.

A working manual from start to finish. Takes up in detail the location, design and equipment of plants, methods of manufacture, kinds of machines, amounts of materials, figures, on the cost of production at various points, little "kinks" which will aid in satisfactory and economical production, etc. It will endeavor to be so complete as to furnish an answer on almost any question which can arise with regard to this important branch of the concrete business. More space will be devoted than heretofore to matters pertaining to large pipe for transmission mains, sewers and the like, giving a considerable amount of data from various cities and other places where large pipe has been used. Sent prepaid for \$1.00.

The Cement Era Publishing Co.
Chicago

Cement Directory

1912 EDITION

NOW READY

A thorough revision of the well known Directory of Portland Cement Manufacturers, together with Manufacturers of Gypsum and Lime, bringing down to date descriptions of manufacture, capacity, capitalization, accompanied by names of officers and superintendents, post-office addresses, a list of brands and a buyer's guide.

This directory stands alone. It has an established reputation of six years as reliable, up-to-date and authentic, complete, neat and handy. Is so useful and handy to anyone in these industries that it is almost indispensable. Order now for early delivery. Sent prepaid for \$1.00. Will contain about 300 pages, 3x5 inches, to fit the pocket; bound in black flexible leather covers; gilt edges.

The Directory of Portland Cement Manufacturers

1207 Morton Bldg., - Chicago, Ill.

See our exhibit
Booth 294
New York
Cement Show

Home of
**ORIENTAL
STUCCO,**
Hard Wall
Plasters,
Etc.



ORIENTAL STUCCO

**Shipped Ready for Use
Add Water - All Colors**

This Prepared Stucco removes the difficulties of stucco construction. Being lime-prepared, it is slow setting, insuring perfect bond. Makes perfect "float" or "dash" finish. Bad places may be patched without defacing the job. Joinings do not show. Made in a number of pleasing tints. Recommended by architects, demanded by owners. Easiest for the contractor to apply.

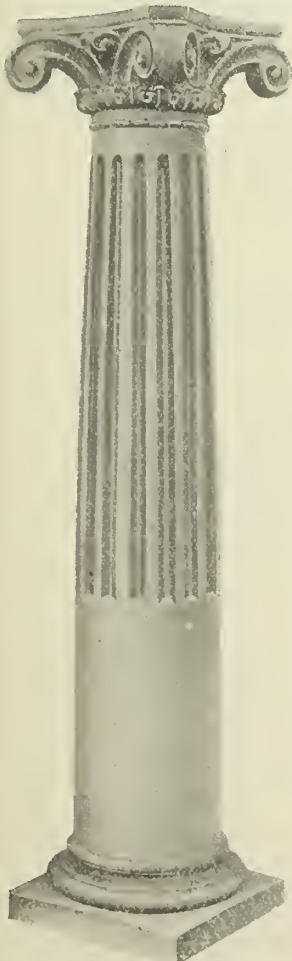
Write for Free Booklet

Our new book on stucco work illustrates several fine stucco jobs and contains information about getting the right effect with stucco. Copy of this book sent free on request.

MONUMENT PLASTER CO.

Manufacturers Also of Slow Setting and
Quick Setting Wall Plasters.

2 Essex St., - - - Harrison, N. J.



BEFORE you decide, look over the fence—possibly you may be on the wrong side. You can't form an accurate opinion on any subject until you know the facts. To obtain facts you must observe with the brain as well as with the eye.

The successful contractor is one whose work commands admiration. Why? This is where your brain will furnish you with the facts.

The efficiency of our molds is two fold.

First, they produce in concrete, designs that are proper and attractive.

Second, our Locking and Squaring Device guarantees a perfect alignment of each piece molded.

Columns, etc., will line up absolutely perfect.

These are facts which your eye will discover.

Are not these facts present in this beautiful monolithic column?

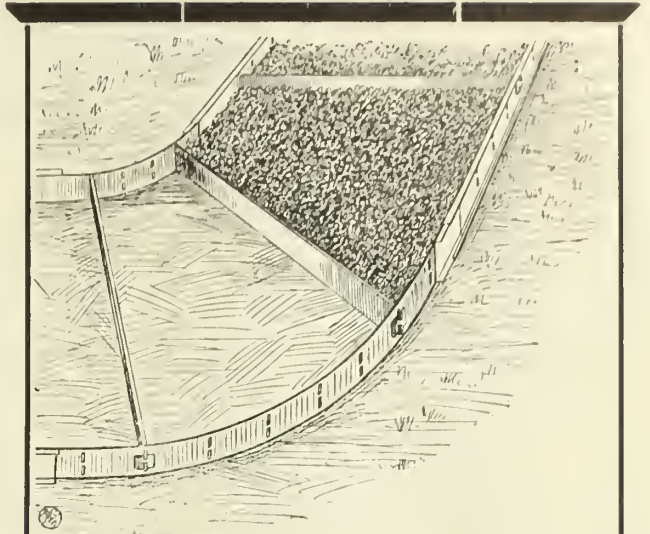
It is molded in our molds.

Our catalog is full of these facts. Ask for it.

ARCHITECTURAL MOLD CO.

1117 E. Warren Ave.,
Detroit, Mich.

H. W. Remington, 19 South St.,
New York, N. Y.,
Eastern and Foreign
Representative.



*Illustrating the Construction of a Concrete
Sidewalk with*

Berger's Pressed Steel Forms

These forms are easily put in place, have an easy working slip joint connection, securely held by a never-failing spring wedge; light in weight—fully 20% lighter than any other metal forms of anywhere near equal strength.

There are no projecting rivet heads—nothing to interfere with the finishing tools. The concrete cannot possibly seep through while tamping.

The highest efficiency, both as a time and a labor saver has been reached in

Berger's Pressed Steel Forms

With these forms your men can work at top speed—everything goes together smoothly and quickly.

On every foot of sidewalk you lay, these forms will save you money—money that you might as well have.

*So why not drop a line to the
nearest branch today? Just ask for
Book A.*

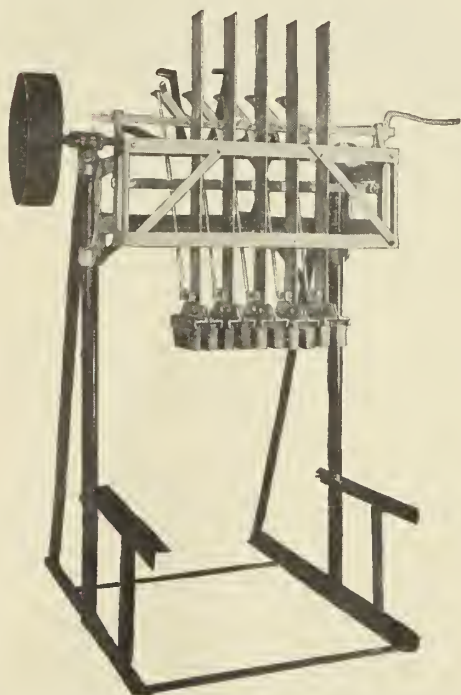
The Berger Mfg. Co. Canton, Ohio

Philadelphia Boston New York Chicago
St. Louis Minneapolis San Francisco Atlanta

Also manufacturers of

Metal Lumber, Vault Lights, Prong Lock Studs and Furring,
Expanded Metal Lath, Rib-Truss, Ferro-Lithic, etc., etc.

DON'T TAMP YOUR LIFE AWAY



You CAN'T make good blocks or brick or other concrete products tamping along by hand. Your men start off nicely in the morning but the strokes get lighter and lighter as the day grows—the last block tamped at night isn't anywhere near as dense as the first one made that day. And your output is limited by your TAMPING, not by the speed of your block machine.

Increase your capacity, improve your product and save backache by installing a

NOLAN AUTOMATIC TAMPER

Built of angle steel. Mounted on the floor or hung from the ceiling. Fits any block or brick machine. Size, number and arrangement of tamping arms easily adjusted to fit any machine. Each tamping arm delivers a 50-lb. stroke, SIX TIMES EVERY SECOND.

The device is so constructed as to operate with a minimum vibration and is practically noiseless.

The purchase of this tamper won't be an EXPENSE, it'll be an INVESTMENT which will yield 100% return in a few weeks.

Write for descriptive circulars and details.

Automatic Concrete Machinery Co.

141 East Fifth St.,

ST. PAUL, MINN.

MID-WEST CEMENT EXPOSITION

UNDER THE AUSPICES OF THE

Nebraska Cement Users' Association

H. C. McCord, Prest., Columbus, Neb.

Omaha, Feb. 6-7-8-9, 1912

LECTURES—Experts in concrete work will read valuable papers—come and learn how to keep up with the cement procession.

EXHIBITS—The Association will exhibit a fine lot of cement products. Machinery manufacturers will show the latest machines.

EXHIBITORS

This is a "live" show—ask some exhibitor who was here last year. Write for space now.

VISITORS

Knock off work and come to this show—you'll get new ideas that will help you.

Address **PETER PALMER, Secretary**
OAKLAND, NEB.

CEMENTKOTE

The fact that many of the largest users of concrete in the country are using CEMENTKOTE—that the largest concrete elevator in the world is damp-proofed with CEMENTKOTE—only goes to prove our contention—

That—Every Builders' Supply Co., Contractor and Architect should know that—They can get a damp-proofing that will damp-proof.

That—CEMENTKOTE beautifies and prevents spotting.

That—CEMENTKOTE lasts as long as the cement itself.

That—CEMENTKOTE does not interfere with the chemical action of the cement.

That—Anyone can apply CEMENTKOTE.

That—CEMENTKOTE is made in soft and pleasing shades.

That—CEMENTKOTE is not an experiment. In other words every Dealer, Contractor and Architect should know all about CEMENTKOTE. Ask for samples and descriptive matter, or better still, ask to have one of our representatives call on you.

The Tropical Oil Co.

CLEVELAND, - OHIO



For Concrete Floors

Concrete floors are made dust-proof, durable, elastic and impervious to water by the application of "Cementseal." No amount of heavy trucking or other abrasion will mar the surface.

Cementseal Wears Like Tiling

One gallon of this preparation will cover from 250 to 300 square feet of concrete floors, two coats. No primer needed.

CEMENTSEAL is elastic, sanitary, economical, dust-preventive, waterproof, acidproof, alkaliproof, greaseproof, easy to keep clean; it never chalks, peels nor chips, it brightens the floor and gives it the consistency of hard rubber.

Made in five tints. Write for booklet describing this floor finish and color card showing tints.

THE ACORN REFINING CO.
CLEVELAND, O.

Cemeline

Richmond Bros.,
117 Sixth Ave. E.,
Cincinnati, O.
I enclose \$1.65 for 1 gal.
of CEMELINE

Name
No.
St.
City
State

C-8-11

If you want to make your concrete proof against water, fire, acids and alkalis, paint it with Cemeline, "cement's proper affinity." This forms an impervious coating which not only protects the structure but decorates it. It comes in nine colors. Send the coupon and get a sample can for trial.

Cemeline

CEMENT'S PROPER AFFINITY

CEMELINE is a thorough waterproofing. It hermetically seals the surface of the concrete, filling all the voids. Prevents the appearance of stains. Colors the surface in pleasing tints without defacing the natural texture of the concrete.

It costs \$1.60 per gallon in 5-gal. lots. Send the coupon with \$1.65 and get a sample gallon. Try it. See how you like it.

RICHMOND BROS.

Paints and Varnishes

117 Sixth Ave. E., Cincinnati, O.

Cemeline

Coleman's Waterproof Filler

A waterproofing liquid that does the work effectively and permanently. A positive water resistant and shield against dampness and decay. Not a stain nor a coating but the only transparent waterproofing liquid FILLER patented. Chemically prepared and designed for waterproofing Concrete Blocks, Brick Walls, Stone, Wood, Plaster, Kalsomine. Penetrates the surface and becomes a part of the material to which it is applied. An honest compound. The best by test. Give it a trial. Send for Booklet.

Virginia Waterproofing Corp. Mfgs.

324-326 Arcade Building,

NORFOLK, VA.

BITU-MORTAR
WATERPROOFING
WATERPROOFS PERMANENTLY

A bitumen preparation which bonds to old or new walls and waterproofs cellars and foundations PERMANENTLY, even when water is seeping through. Applied inside or outside of walls. Resists any water pressure that the wall itself will stand.

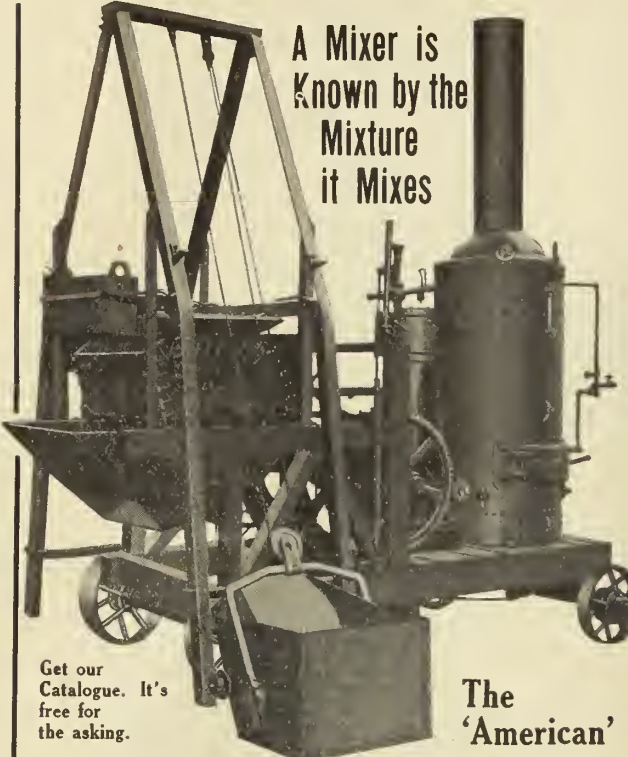
THE BITU-MORTAR CO.

342 E. 27 St.

NEW YORK CITY

Send for a free copy of our book, "The Ideal Method of Waterproofing."

A Mixer is Known by the Mixture it Mixes



Get our Catalogue. It's free for the asking.

The 'American'

The "American" has built up its reputation on the mixture it turns out for ALL kinds of concrete work. It's a batch mixer—and the drum does not revolve. The materials are cut, and doubled and plowed by the steel plows in the mixing drum. The illustration shows the "American" mounted on trucks, with power loader and traction.

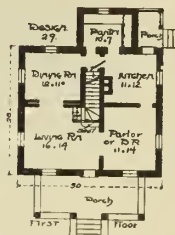
CARGILL MFG., CO.
572 Buttles Ave., Columbus, O.

Plans and Specifications for a Cozy Colonial Cottage

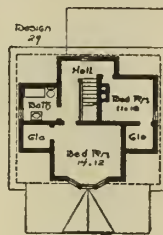
Estimated
Cost
\$1,200
varying
according
to Locality



Design
No.
29



**An
Ideal
Compact
Economical
Home**



Plans arranged for 8" x 16" Block, or for Frame and Siding.

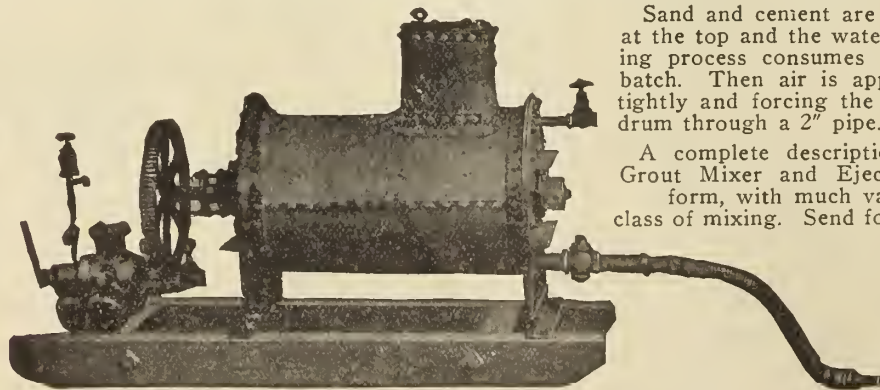
Dimensions: 30' x 28'. First Floor 9'-6". Second Floor 8'-6". Full Basement, Laundry, Cellar and Fuel Room. *Complete Blue Print Plans* of all the floors and elevations drawn to $\frac{1}{4}$ " scale, full details and specifications in duplicate, \$10.

Concrete Publishing Co., Detroit

**Six Hundred Bags of Cement
Mixed into Grout and Discharged
Through a Hose Every Eight Hours by a**

COCKBURN Grout Mixer and Ejector

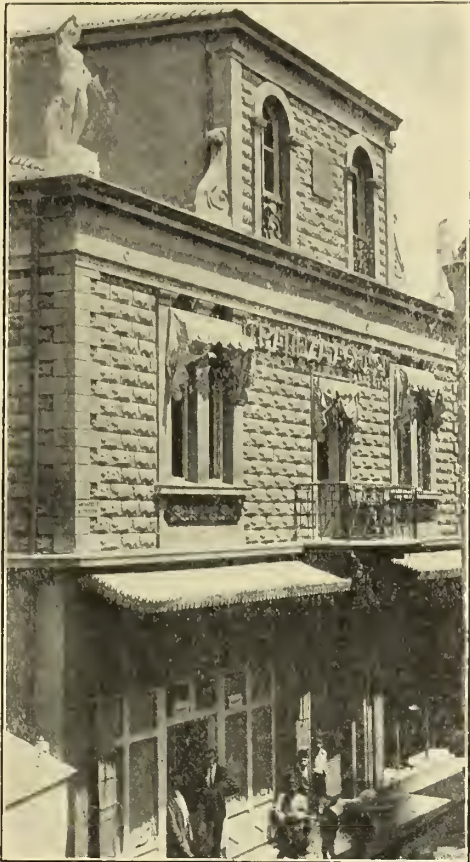
This machine is a complete mixing unit, with air engine attached. It is the most efficient grout mixer made and is cutting costs on every job where it is used.



Sand and cement are shoveled into the hopper at the top and the water is turned on. The mixing process consumes two minutes or less per batch. Then air is applied, closing the hopper tightly and forcing the grout out of the mixing drum through a 2" pipe.

A complete description of the COCKBURN Grout Mixer and Ejector is printed in folder form, with much valuable information about this class of mixing. Send for a copy of this folder.

**The
Cockburn Co.**
12th and Monmouth Sts.
Jersey City, N. J.



HERCULES Block Machines in Turkey

The building shown here is in a Turkish city, built of blocks made on a HERCULES CONCRETE BLOCK MACHINE. Note the fine effect made by the ornamental frieze—this also made on the HERCULES.

HERCULES machines are making blocks, sills, lintels and other building units in all parts of the globe. HERCULES machines have built up a reputation for themselves because they enable the operator to turn out a good product of wide variety of size, shape and design, all on one machine.

Why you should buy a Hercules

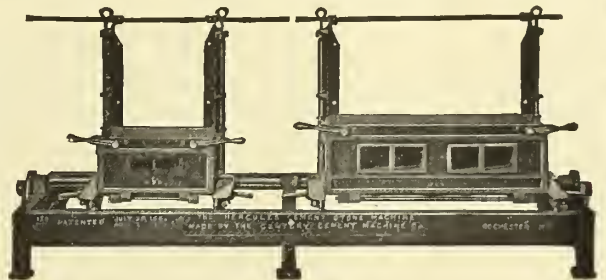
BECAUSE: You can make one or two blocks at a time; you can make anything from a 4" block to a 6' sill; you can make the blocks of wet mixture; you can EXPAND the machine to increase your output, without throwing away a single part. If you're going to start in the block business, get started right. "THE LITTLE BOOK" tells how.

Century Cement Machine Co.

285-295 St. Paul St.,

ROCHESTER, N. Y.

TWO MACHINES IN ONE



"The Little Book"

A book about the concrete business and concrete machines. Small, fits the pocket, concise, valuable. As books go, this is a nugget. Copy sent on request.



WATERPROOFING PRODUCTS

A Complete Series of compounds for every possible need of the engineer and builder for stone, brick or **concrete** under conditions where anything from heavy subterranean water pressure to ordinary moisture and weathering are to be resisted. In other words, no matter what the water trouble, we can solve it for you.

Write for literature describing further what we mean.

WATERPROOF ENGINEERING COMPANY

Waterproofing Engineers and Chemists
908 First National Bank Bldg., CHICAGO, U. S. A.



First National Bank, Northport, L. I.
KIRBY & PETTIT, Architects

The foundation of this building was waterproofed with Lapadas. This building is four feet below water level and 300 feet from the bay.

You Can Waterproof With

LAPADAS

waterproofing paste to be dissolved in the water used in wetting down the concrete or cement mortar.

SOLOTO

weatherproofing solution used to protect and harden concrete and stucco walls already erected. Apply with a brush.

McCOY'S ELASTIC CEMENT

for caulking around windows, doors, roofs, sky light, vault lights and cornices.

Write for booklet, "Facts on Waterproofing."

Hydro-Bar Waterproofing Company

34 West 33 Street, - New York, N. Y.

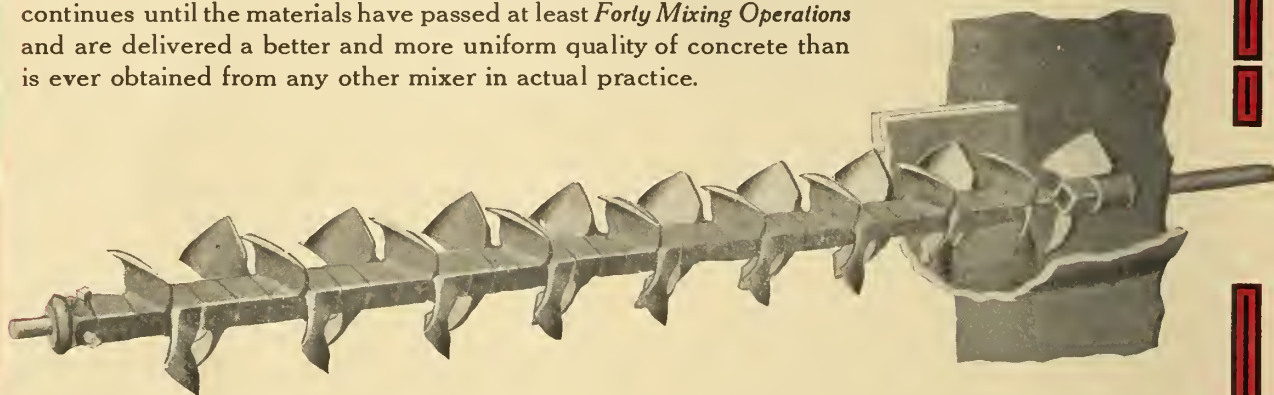
EUREKA

Automatic Measuring
and Time
Mixing



The Period of Mixing is Automatically Timed

Every particle of cement, sand and stone is *mixed the same length of time* before it can be discharged. The mixing compartment of the Eureka is the longest used on any mixer. The special plow-shaped blades cut through the materials from the bottom, lift and pour them over and through each other. This process of *Shoveling, Pouring and Cutting Through* continues until the materials have passed at least *Forty Mixing Operations* and are delivered a better and more uniform quality of concrete than is ever obtained from any other mixer in actual practice.



A Dry Mix Before Water and Stone are Added

Any experienced concrete man will tell you that if you thoroughly mix cement and sand or gravel dry you have the fundamental requirement of a high quality of concrete. This is precisely what the Eureka does. It thoroughly mixes dry before the stone and water are added. This is done in a part of the mixing compartment that no water ever reaches. Hence the cement does not ball, but completely intermingles with the sand with no delay in the process. After this follows a thorough wet mix of the whole mass. In using barrows or carts, a batch can be drawn.

Exhibits at New York, Chicago
and Kansas City Cement Shows

The Eureka is built in sizes from 5 to 25 cu. yds. per hour
Catalog No. 16 is ready for you.

Over 250 Eureka's used in
New York City



Eureka Machine Co.

60 Handy St.
Lansing, Michigan



RESIDENCE IN HARTFORD, CT.
Stained with Cabot's Waterproof Cement Stains
Brocklesby & Smith, Architects, Hartford



RESIDENCE AT MONTCLAIR, N. J.
Stained with Cabot's Waterproof Cement Stains
Dudley S. VanAntwerp, Architect, Montclair, N.J.

Cabot's Waterproof Cement Stains

**Artistic and Durable Coloring Effects
Completely and Permanently Waterproof
Easily and Quickly Applied With a Brush**

They thoroughly waterproof cement concrete or plaster without weakening them, and they color the surface in soft, natural tones without spoiling the texture. They are made with the strongest and most finely ground pigments, like those used in Cabot's Shingle Stains, and being Stains, they sink into the pores of the cement and color the surface without coating it. They therefore cannot crack or peel or grow chalky, like paints and similar coatings, but become softer and more artistic after weathering. They cost much less than the heavy, opaque paints and coatings, can be applied about twice as fast, and cover about twice as much surface.

Sample card and catalogue sent free on request.

Samuel Cabot, Inc.

1133 Broadway, New York

Manufacturing
Chemists

Boston, Mass.

350 Dearborn Ave., Chicago

Agents at all Other Central Points



TWO COTTAGES ON THE MANHATTAN BEACH ESTATES
Stained with Cabot's Waterproof Cement Stains
George Nichols, Architect, New York

Waterproofing Material of Proven Value

Keystone Waterproofing

This product is the best and least expensive for rendering heavy masonry work watertight. The material is in powder form and is mixed with the concrete. It waterproofs perfectly by making the entire mass water-repellant throughout. No additional expense for extra excavation. No expense for application. The structure is waterproofed as it is built up. Used in the McAdoo Tunnel system in New York and scores of other big jobs. Write for booklet dealing with the whole waterproofing problem.

Harrison Waterproof Materials Co.
34 Church St., New York City.

Booklets on Waterproofing.

Tell us just what class of construction you want to make waterproof and we'll send you a free booklet on that class of work with our recommendation of the material and methods to use.



New Auxiliary Reservoir, Asheville, N. C.

This Great Reservoir Leaked Badly, but—

was thoroughly waterproofed
by the use of

Trus-Con Waterproofing Paste

Everyone should investigate carefully the simplicity of application and the uniformly thorough and satisfactory results obtained with *Trus-Con Waterproofing Paste*. Exhaustive laboratory tests and practical use under exacting conditions have demonstrated that *Trus-Con Waterproofing Paste* will give results that are both positive and permanent.

The method of applying is extremely simple: merely add the Paste to the water used in mixing your concrete or mortar. The entire mass is then thoroughly and uniformly waterproofed, as the Paste is distributed with the water to all parts of the concrete. Chipping or abrasion of the surface does not affect its waterproofing qualities. It can be added to the water for homogeneous distribution, or concentrated in a plaster coat on the surface of the structure.

Trus-Con Waterproofing Paste is shipped for convenience in five-gallon, ten-gallon, half-barrel and barrel quantities, ready for instant use.

Ask for our literature and suggestions; also free copy of "WATERPROOFING AND FINISHING SPECIFICATIONS" and "STORY OF THE ASHEVILLE RESERVOIR."

Trussed Concrete Steel Co.

450 Trussed Concrete Bldg.

DETROIT, MICH.



WHAT, Porous? You Say Porous? LISTEN

Give to them the chance PORTLANDS deserve. Cater to them instead of to the patent medicines—pastes and powders—you have bought.

Get on terms of intimacy with the
Best, Most Versatile Product Ever Made.

Portland Cement

and discover, as you then will

THE BEST **WATER-PROOFING** ON EARTH

THE MOST POSITIVE OF RESULTS;
THE MOST ENDURINGLY EFFECTIVE;
THE MOST ECONOMICAL OF ALL.

A Book that rings true, strikes the nail squarely, treats the subject tersely, instructively, yet interestingly, is

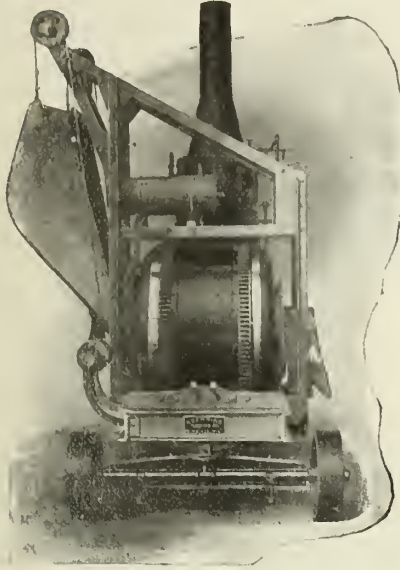
"The Hydrolithic System"

You should have a copy. Free, postage paid to your address.

The Good Products Co.

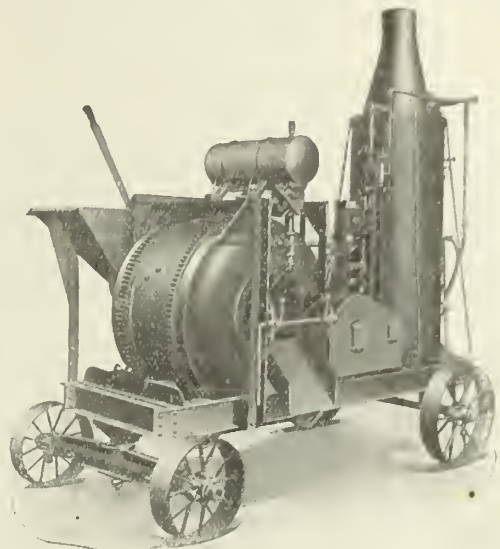
1705 West Austin Ave.,
Chicago, Ill.

YOU ARE VITALLY INTERESTED



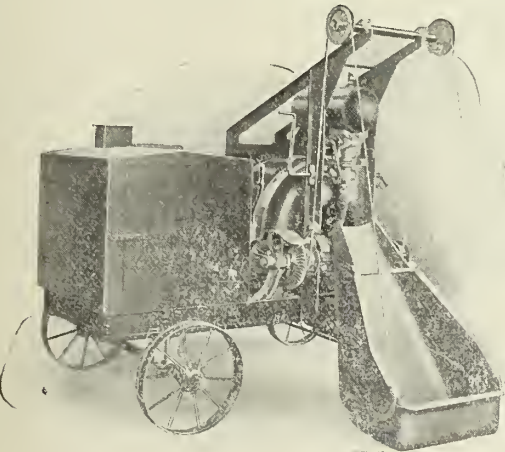
In the mixing and lasting qualities of the **KOEHRING CONCRETE MIXERS.**

Because you want the best and most profitable that can be had for the money you are investing, is the reason why it is to



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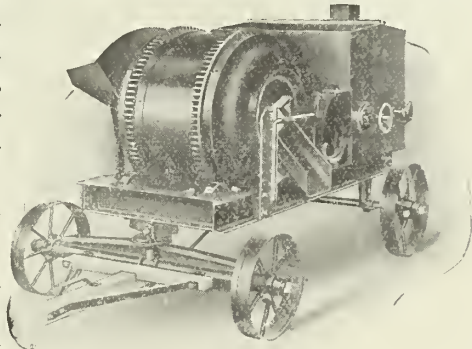


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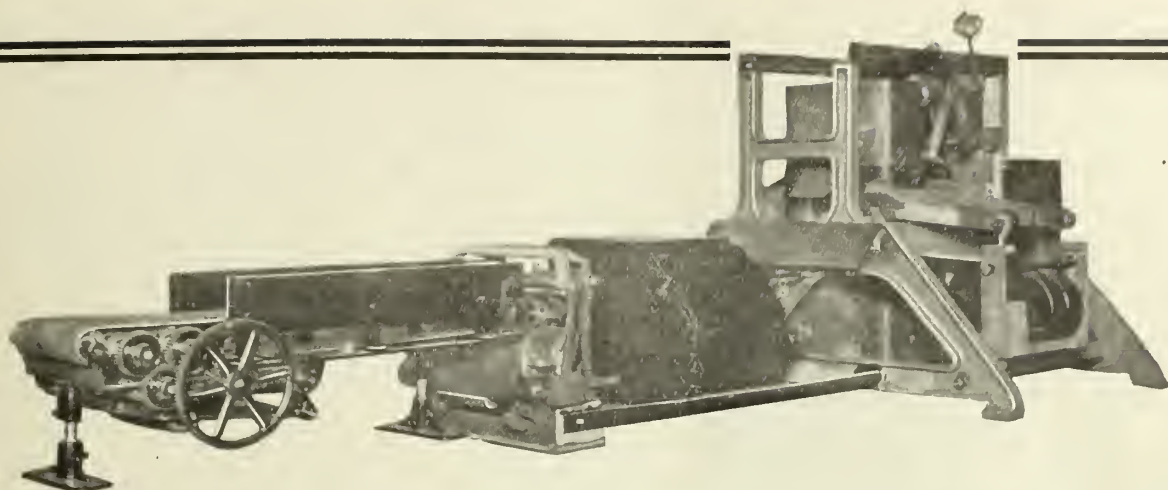
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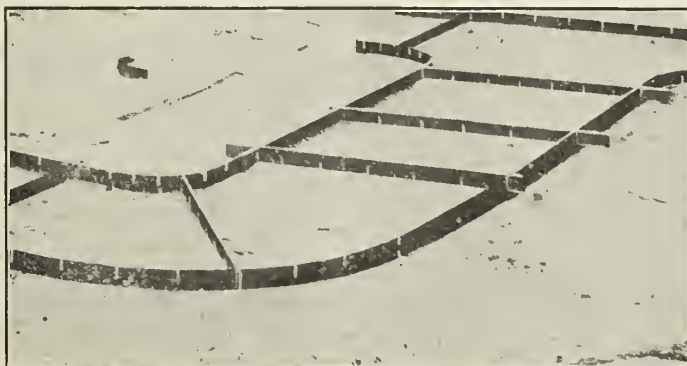
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—WITHOUT FORMS—

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This silo was built **WITHOUT FORMS** by using **KNO-BURN Expanded Metal Lath**.

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Mortar.

CONCRETE

VOL. XII

JANUARY, 1912

NO. 1

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ADVANTAGES OF CONCRETE IN THE CONSTRUCTION OF INDUSTRIAL BUILDINGS.*

From an industrial point of view, the advantages of a reinforced concrete building are its fireproofness, waterproofness, verminproofness, sanitary qualities, maximum light available, load carrying capacity, vibration resistance, permanence, adaptability, speed of construction, low heating charge, low initial cost and fire protection value.

Fireproofness. It is a well known fact that any material when subjected to severe heat for a sufficient length of time will disintegrate, and a few years ago a great deal was heard about the dehydration of concrete under fire. As a matter of fact, it has been demonstrated by numerous fire tests that heat penetrates concrete slowly and that even in great conflagrations concrete is practically impervious to fire. The Baltimore and San Francisco conflagrations tested concrete most rigorously. The results were satisfactory

in every way; so much so, that in rebuilding San Francisco concrete in one form or another was used in most of the new buildings. In the case of the F. W. Tunnell & Co. glue plant, Philadelphia, the fire, which did \$22,000 damage to brick and mill buildings and to the contents of a concrete building, injured the concrete building itself so slightly that an expenditure of \$15 patched the few pit marks in the concrete, and \$132 put the windows in good condition.

Waterproofness. In most fires the most serious damage to the contents of a building is due to water. To this condition, concrete buildings owe much of their popularity at the present time. A concrete floor is a monolith, and water from sprinklers or hose will remain on the floor where it falls and does not run through several stories as in the case of ordinary types of construction. The best practice of the day in the design of concrete industrial buildings provides a small curb, generally not over three inches high, at all stair and elevator wells, lower shafts and other openings through floors, so that there is no possibility of water from a flooded floor flowing into the lower story. To make this certain, scuppers are usually placed in the walls. Furthermore the waterproofness of a reinforced concrete building is an advantage to an industry requiring frequent cleaning of rooms or floors.

Verminproofness. As a concrete building is a homogeneous mass, there is no place in which vermin may

*This material is an abstract of the introductory chapter on the Advantages of Concrete Construction in "Factories and Warehouses," just published by the Association of American Portland Cement Manufacturers. In this connection the attention of the reader is called to a paper by J. P. H. Perry, published in the May, 1911, issue of CONCRETE, entitled "Cost and Maintenance of Various Types of Building Construction." Mr. Perry presented figures which show the financial advantages of concrete quite unmistakably. The figures along this same line, now presented, differ slightly from the earlier ones but they reach the same conclusion.—Editor.

hide. Mice, rats, cockroaches and other pests are excluded automatically from a concrete building. One paper goods manufacturer has stated that his concrete building saves him \$5,000 a year on this item alone.

Sanitary Qualities. Not only are concrete buildings verminproof, but they are exceedingly sanitary along other lines as well. A building in which there are no dry rot, no dampness, no vermin, and where concrete made with cement which is a lime product and naturally sanitary, is the chief material of construction, must be very nearly ideal from a hygienic viewpoint. Concrete buildings are cool in summer and warm in winter, the slow conductivity of heat being responsible for this condition. This property also improves the sanitary conditions of the building.

85 Per Cent Window Area.

Maximum Light Available. The sanitary qualities of a building and the efficiency of employes vary almost directly with the amount of light obtainable in a building. The ordinary brick and mill construction, brick or frame building has rarely over 20 or 30 per cent of its wall area in windows, whereas the normal window area for a reinforced concrete factory is 50 per cent, and in many cases runs as high as 85 per cent. Owners of concrete buildings have shown that they can increase the efficiency of their employes 5 and 10 per cent, and often more, by having well-lighted, clean rooms.

Load-carrying Capacity. After fireproofness, it was probably the strength of reinforced concrete construction which first attracted to it the attention of the building world. Reinforced concrete increases in strength with age. There are many tests of cement and concrete briquets and cubes which demonstrate beyond controversy the increase in strength with time. Concrete floors which have been designed for a strength of 200 pounds have been known to carry 500 and 600 pounds, and floors which have been designed for loads of 600 pounds are carrying 1,200 and 1,500 without causing the slightest deflection. Concrete floors have been built to carry as high as 5,000 pounds per square foot. If an owner desires a building to be four stories high, but to be so built as later to carry a fifth story, the columns are designed to carry the loads which would be brought on them if the building were ultimately to be only four stories high. At the end of a year or two these columns will have increased in strength to such an extent that a fifth story may safely be added, and the resulting loads on the columns will not produce stresses above the factor of safety used in the original design.

Vibration Resistance. A reinforced concrete factory or warehouse, properly designed and erected, is the most rigid building which can be put up. It has been found that in reinforced concrete factories the usual difficulty of installing machinery so that high frequency vibration will not in a short time loosen the fastenings, as well as cause loss of adjustment to the machines, has been almost entirely overcome.

Much Better Cement Today.

Permanence. Concrete has been used since the days of the Romans and probably back of them. The dome of the Pantheon is of concrete, as are also the founda-

tions under the palaces on the Palatine Hill in Rome, and these works show the marks of the forms which were used in those early days and are still in excellent condition. Today the cement which is being used, as far as engineering judgment based on seventy years of experience can determine, is a better cement than was used two thousand years ago. The cement of the old days was a natural cement, a cement which was probably non-uniform in its composition. Today our cement is a Portland or artificial cement, which is kept uniform by constant chemical analysis. Although the oldest reinforced concrete building in the country is not much over twenty years of age, the technical world has long since given up worrying over the permanence of this material.

Adaptability. Peculiar conditions are often arising in the design of a factory or a warehouse building which the lack of reinforced concrete would make difficult and expensive to meet. This is particularly true in foundation work. Reinforced concrete spread footings, cantilever footings, buttress walls, etc., are usually specified by engineers to save expense in this class of work. Special cantilever beams, special thickness of floors, specially shaped beams or girders or columns can be worked out in reinforced concrete when similar details would be considered impossible to those whose knowledge of designing was limited to other materials.

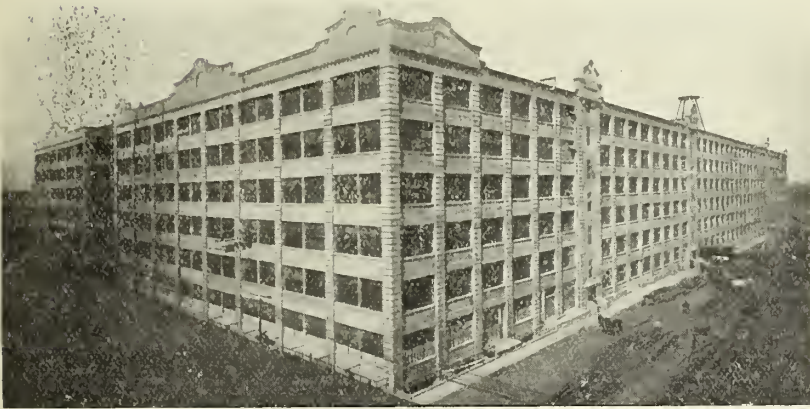
Build a Story a Week.

Speed of Construction. The Mason warehouse at 134 Johnson Street, Brooklyn, New York, is 40' by 80' in plan, seven stories and basement in height. After the completion of the excavation but 48 working days were used to the completion of the roof, and the building was turned over ready for occupancy, including plumbing, heating, lighting, and elevators, in three and one-half months after signing the contract. The Robert Gair warehouse, on Front and Washington Streets, Brooklyn, New York, a 12-story building with 20,000 square feet to the floor, was constructed, twelve floors in eleven weeks, and the building turned over ready for occupancy in seven months after signing the contract. It is the general practice of reputable concrete construction companies in the United States today to carry their buildings up at the rate of a story per week after the first floor is concreted. A seven-story building, about ten thousand square feet to a floor, can be guaranteed completed in from four to five months after the contract is signed. Especially is the speed of concrete construction apparent when re-building after a fire. Concrete construction can be started as soon as the ruins are cool, and no delays incurred on account of completion of shop drawings, rolling and fabricating of steel, or because of impossibility of quick shipment of large sizes of timbers for first-class mill construction. Work on concrete footings and lower story columns actually goes ahead while plans are being completed. This condition has applied in a number of buildings and has been worked out in an excellent manner.

Low Heating Charge. It has been found in reinforced concrete buildings that it costs less money to



American Optical Co., Southbridge, Mass. Reinforced concrete skeleton framework, Kahn system. The interior construction for floors and roofs is solid concrete spanning directly between the lines of beams connecting the columns. The slab is built in an arched form to secure maximum strength with minimum weight and is of cantilever design. Connecting the main factory with the power house, but not shown in the illustration, is a reinforced concrete bridge which consists of an enclosed conduit about 6' x 4', for carrying piping, wiring, etc. S. F. McIntosh, engineer.



Bush Terminal Co. buildings Nos. 5 and 6. Each building is 600' x 75' in plan, 82' high—6 floors. There is a connecting wing between the two buildings which is 100' x 205', 94' high—7 floors. Designed floor load, 200 pounds per square foot; windows, 50 per cent of wall area; beam and girder construction; column spacing, approximately 25' x 18'; concrete curtain walls; roof, concrete covered with Barrett roofing; floors, granolithic concrete; fire protective devices, sprinklers, hose, tanks, fire doors and wire glass; insurance rate varies from 8.4 cents to 11.9 cents per \$100 on buildings. William Higginson, N. Y., architect; Turner Construction Co., engineers and contractors. Cost of construction, 6 cents per cubic foot; 81 cents per square foot.

Types of Industrial Buildings of Reinforced Concrete



Hudson Motor Car Co. Administration Building
Entrance



Hudson Motor Car Co., Detroit, Mich., office building. This entire plant, including the main factory and the administration building, power house, etc., is built of reinforced concrete, Kahn system. Skeleton reinforced concrete construction. The administration building, shown in illustrations, has cement stucco coats applied directly to the concrete columns and beams, and to the brick curtain walls supported upon them. The administration building is 52' 2" x 180', with one row of columns down the center spaced about 16' apart. A line of girders occurs only at the columns and extends across the building. Between the girders a reinforced hollow tile construction is used. Stairways are of reinforced concrete. The main factory part of the Hudson plant, not shown, is very extensive. The reinforced concrete construction in this case consists of intermediate beams with short-span floor slabs. Albert Kahn, architect, and Ernest Wilby, associate; A. J. Smith Construction Co., contractors; Trussed Concrete Steel Co., reinforcing.

maintain an even temperature than with most other types of construction. It may take some time to heat a concrete building, but after it has once been done the loss of heat by radiation is slow. The low conductivity of concrete is responsible for this.

Low Initial Cost. Compared to any other fireproof type of building, reinforced concrete for industrial buildings is the lowest in initial cost. It is generally found that on a four or more story factory or warehouse, with live loads of 150 pounds or more, reinforced concrete buildings cost from 10 per cent to 20 per cent or even 25 per cent less than a similar design in structural steel properly fireproofed. Compared to non-fireproof buildings, concrete will vary from equal cost on large propositions to possibly 30 per cent greater cost on medium sized buildings, and sometimes 40 per cent and 50 per cent on the smaller buildings when the comparison is made with the cheapest form of brick and frame construction.

Fire Protection Value. Some of the evidence on this point has already been given. When it is realized that the underwriters' records show that there are forty fires causing loss in excess of \$25,000 per fire every week among industrial buildings in this country, and that the annual per capita loss for the United States is something in excess of \$2.30 as compared to an average loss per capita of seven European cities of 30 cents, it seems incredible that a progressive and keen industrial executive should consider putting up a non-fireproof building, especially when the cost of a reinforced concrete, fireproof building under most conditions would not exceed that of a non-fireproof type of building by over 10 or 15 per cent.

The Objections.

Many as are the advantages of concrete construction it is too much to expect, particularly in view of the fact that its general use is comparatively modern, that some who are not entirely familiar with the material shall not raise some objections to its use.

It has been said that it is very difficult to install machinery, piping and mechanical equipment and to make changes in such installations in a reinforced concrete building. While it is undoubtedly true that it is harder to cut into a concrete ceiling or beam than into wood or brick, the extra amount of labor really is a small matter. Provision is usually made for mechanical equipment and for piping as well when the building is erected. Holes are made to take $\frac{3}{4}$ " bolts and these holes are spaced usually from 24" to 36" on centers in beams and girders, just under the floor slabs. By the use of hanger bolts or sockets any kind of equipment can be rigidly supported. In construction where there are no beams or girders, cast-iron spool sockets are set at regular intervals in the ceiling. Most machinery is set on the floor and not supported from the ceiling. When the machinery is sufficiently heavy it may rest on the concrete floor without bolting or be grouted in place. For attaching lighter machinery to floors, holes are usually drilled from 2" to 3" deep and expansion bolts used in these holes.

Even if no provision is made when the building is erected the installation of machinery still is a simple

matter. The general practice is to use expansion bolts set in holes drilled in the concrete. In large buildings where a great deal of this work is to be done, the problem is met by having on hand a small portable air compressor operating pneumatic drills. The results of an investigation of some fifty concrete buildings in New York City about a year ago show that mechanical engineers and factory superintendents, after the first few weeks of occupancy of the new buildings, came to regard cutting holes into concrete beams for setting expansion bolts about as they regard cutting into wooden beams.

It has been said that employees have objection in some cases to working on concrete floors, but there is no particular reason why a man's feet should become sore from walking on concrete floors any more than from walking on concrete sidewalks as everybody does. At the Bush Terminal Company's plant, South Brooklyn, N. Y., there are about 112 acres of floors in reinforced concrete factories and warehouses. Maple floors were laid on top of the concrete slab in the first 30 acres. The remaining 82 acres of floor are of granolithic concrete. Considering that these buildings are for rental to industrial concerns, the lesson is obvious, particularly in view of the fact that the buildings have to meet the requirements and idiosyncracies of unknown prospective tenants, and also in view of the fact that these buildings have been rented faster than they could be completed.

Dusty Floors.

There is another objection that concrete floors give trouble by dusting. The only refutation is in the statement that the concrete floors which have been laid by men who understood their business thoroughly, and applied the latest and best principles in floor construction, put down floors which do not dust. Silicate of soda applied every few months in cases of extreme wear will practically do away with dusting and in the ordinary usage of granolithic floors, application may be made every year or two.

Some people have said that concrete buildings are damp. This is absolutely a fallacy. Concrete walls 8" thick, properly built, are practically impervious to the weather. Where there is a very low temperature outside and a very high temperature inside, there is some tendency toward condensation on the walls, but this is a quality true of any wall which is not furred to provide a dead-air space. The fact that piano factories, which require absolute dryness, or as near it as it is possible to obtain, have been built of reinforced concrete and given satisfaction, is proof against this fancied objection.

The appearance of concrete has been objected to. Men have seen brick and stone so many years that they are familiar with the differences between good work and poor work in these materials. They have not been sufficiently familiar with concrete in all cases so far to know good concrete from poor concrete. Beautiful walls may be made of concrete at a very low cost by good workmen, but beauty is largely a mat-

(Continued on page 71)



Dodge Brothers' automobile parts plant, Detroit, Mich. Probably the largest of its kind ever built. Kahn system reinforced concrete construction throughout; complete skeleton construction. A view along one side of the plant is shown in the illustration. The main factory portion is U-shaped, 1050' in length and 4 stories high. The width of the U is 65' with two rows of columns extending down the length. In the construction of the floors and roofs, a special flat ceiling design of the Kahn system was used. This consists of a combination of hollow tile and reinforced concrete. The windows extend full width between the columns and directly up to the ceiling line so as to get maximum lighting. The lintel beams extend above the ceiling line, equipped with United steel sash. In front of this building there is an office building 117' x 54', 2 stories high, also reinforced concrete; also a power house, 102' x 120'. Back of the main plant is the main forge and blacksmith shop which is 400' long. Albert Kahn, architect; Ernest Wilby, associate; Bryant & Detwiler Co., contractors.



Smith Bros. Grain & Elevator Co. building, Ft. Worth, Tex. Kahn system reinforced concrete, skeleton framework, curtain walls of Hy-Rib, plastered with cement stucco. B. J. Carrico, engineer.

Types of Industrial Buildings of Reinforced Concrete : : : :



Storage warehouse and factory of the Great Atlantic & Pacific Tea Co., Jersey City, N. J. Size, 185' x 128' in plan, 9 stories; designed floor load, 300 pounds. Howard Chapman, N. Y., architect; Turner Construction Co., N. Y., engineers and contractors.



Sugar and coffee warehouse of Arbuckle Bros., Brooklyn, N. Y. Size, 206' x 200' in plan, 162' high—12 floors. Designed floor loads, 200 and 300 pounds per square foot. Windows, 50 per cent of wall area. Beam and girder construction; column spacing, 18' 2" x 22'; concrete curtain walls; loose, cold twisted bars for reinforcing; roof, concrete covered with Barrett roofing; floors, granolithic and also maple flooring. Protective devices, sprinklers, hose, tanks, fire doors, wire glass and scuppers. Insurance rate, 14.6 cents per \$100 on building and 46.6 per \$100 on contents. William Higginson, N. Y., architect; F. E. Pratt, N. Y., engineer; and Turner Construction Co., N. Y., contractors.



House of C. I. Bruner, Akron, Ohio; Harpster & Bliss, Architects; Stucco on Hollow Tile

Cement Show Decorations.

Decorations of Madison Square Garden, New York City, for the Cement Show January 29-February 3, will be carried through on a scale not previously contemplated or thought possible with Trade Shows. The ceiling decorations and the concealment of all unattractive construction features of the large hall have been given careful thought and every effort has been made to turn "The Garden" into an attractive place for the pleasure seeker and into an exceptionally well planned room for the display and study of

the two hundred separate exhibits.

The Cement Products Exhibition Co. has advertised widely the advantages of attendance at the Cement Shows to all connected with the industry, and will through the New York press prior to the Show, tell New York of this opportunity, perhaps the last, of meeting the representative manufacturers and designers of concrete and concrete appliances under one roof. As extensive an advertising campaign as this would not be contemplated without equal effort on the part of the management to get exhibits well worth the study of every class.



The bridge shown in the illustration was built over a gully in Lake Park, near Milwaukee, Wis. It is 216' long and 14' wide, entirely of reinforced concrete, Kahn system. The abutments are 14' wide, 9' deep and run back into the earth 16'. They are of concrete proportioned 1:3½:7 cement, sand and stone and are reinforced with ½" round rods placed in the back and spaced 12" apart. The bridge approach is constructed with 12" walls. On top is placed a solid concrete railing. Between these walls is an earth fill. The length is 118' between the faces of the abutments, spanned with two arch ribs, with a spring of 18'. These ribs are 12" wide and have a depth of 5' at the crown. They are constructed of concrete proportioned 1:2:3, cement, sand and stone, reinforced. The reinforcement carrying the bridge is 4 Kahn bars 1" x 3" made continuous and spliced with turnbuckles. Two of these bars are placed in the bottom of the ribs and two are inverted and follow the arch 4' 2" from the bars in the bottom. In order to make the bridge

as light as possible, two openings have been placed in each of the deep parts of the ribs near the abutments. These openings are placed so that upper and lower beams are formed, of which the lower was described. The upper beam is really four beams, one over each opening. The beam over the opening nearer the crown is reinforced with two bars 1" x 3" and in the beam over the opening nearer the abutments, two bars ¾" x 2" are used. The ribs are stiffened by stout brackets 8" wide placed every 12'. A floor designed to carry a live load of 75 lbs. is placed over these ribs. This floor is a concrete slab 6" thick proportioned 1:2:4, cement, sand and stone, and is reinforced with ½" x 1½" bars, spanning on the arch ribs, spaced 9" c.c. The slab is tied together with ¼" round rods 18" c.c., running the full length of the bridge. A concrete balustrade is placed at the outer edges of the bridge between the abutments. This bridge was put up in less time and at a less cost than would have been required for a steel bridge.

HOW TO MAKE LEAKY BASEMENT FLOORS AND WALLS WATER-TIGHT.

BY ERNEST McCULLOUGH, C. E.

One of the problems most frequently brought to the attention of the writer, is that of leaky basement floors. The matter is of such importance and the protective work is so costly that the average owner should understand something of the character of the problem he is facing when his basement leaks.

In the first place it is a most difficult matter to prevent water from seeping into a basement once it has started. The measures taken should be preventive. The usual way is to put in the walls and the floor in an ordinary way and when the basement fills with water the owner tries to solve the difficulty merely with a waterproofing material. Some of these materials are good and some have been on the market too short a period of time to have demonstrated their value.

If the problem is one of water pressure this phase of it must be considered first. One man writes that the water stands three feet deep in his basement and never rises any higher. He had the basement pumped out and a concrete floor laid with some waterproofing compound mixed in it. For a time the floor was tight but after awhile cracks appeared and the water rose to the original level over the floor. He pumped it out a number of times and patched it with asphalt and various waterproofing compounds, but in only a little while things were as bad as ever. Consequently he is disgusted with every compound on the market.

Another man had a leaky cellar and placed over it a layer of concrete three inches thick, surfaced on top, containing a large quantity of waterproofing compound strongly recommended by the local material man. The floor broke into many pieces and he wanted a local contractor to patch it by washing the surface with acid and covering with one inch of rich mortar. He also wanted a guarantee. The local contractor refused to give a guarantee and advised that the floor be torn up and rebuilt to a thickness of eight or ten inches. The owner patched the floor himself and again it broke. Finally he sought engineering advice and paid to have the matter attended to properly. It does not leak now but the floor is considerably more than three inches thick and is reinforced.

The Pressure Exerted.

Let us do a little figuring. One cubic foot of water weighs 62.5 lbs. If the water rises in the basement to a depth of one foot it will require a weight of 1×62.5 lbs. placed on each square foot to hold it down. If the water rises to a height of four feet it will take a weight of $4 \times 62.5 = 250$ lbs. placed on every foot of the floor to hold it down. It generally takes some time to convince clients of this fact, but after awhile the truth dawns. Water will rise always to a uniform level when not confined, and when the water level of a certain piece of land is above the bottom of a cellar there will always be a pressure exerted on the cellar floor equal to the head obtained by the difference in level between the surrounding water and the cellar

floor. The cellar floor must therefore be heavy enough to hold the water down.

For many generations it has been customary in Great Britain for builders to place under all important buildings in low lying, marshy ground a raft of concrete never less than eighteen inches thick and sometimes three or four feet thick. This provides a large spread base on which the building practically floats on the soft ground and keeps the soil pressure within safe limits. The raft being very thick is strong enough to resist the pressure resulting from a high outside head of water, so the basements are dry. This method of construction is something handed down from former generations and is usually heavier than required and is expensive. In late years the probable upward pressure of the water is figured and the floor thickness proportioned to this upward pressure, the effect being to make the basement a boat carrying the building.

A cubic foot of concrete weighs 150 lbs., reinforced, and is usually estimated at 142 lbs. when not reinforced. Assuming that the floor is not reinforced and the water will stand at a depth of two feet in the cellar under ordinary circumstances, the weight of the water will be 125 lbs. on every square foot of the floor. One cubic foot of concrete weighing 142 lbs., the weight of one foot square by one inch thick will be $142 \div 12 = 11.8$ lbs. For the sake of even figures we will call it 12 lbs. The pressure of the water being equal to 125 lbs. per sq. ft. the thickness of the concrete floor slab must be $125 \div 12 = 10.4$ inches. Therefore when a man tries to prevent water from standing two feet deep in the cellar when the bottom of the cellar is two feet below the general water level of the country, he makes a mistake in trying to keep the water out with a three-inch concrete floor containing waterproofing. The concrete used in such situations is generally a very lean mixture with a rich top coating. To keep water from coming in the rich coat should be in the bottom to make the concrete tight. Very lean concrete can be placed over it to make the weight what it should be and then a richer coat for the sake of appearance and to give a good wearing surface can be placed on top.

Making water-tight basements is an engineering problem. Some men argue that a basement floor is generally loaded and that the weight of the goods upon the floor should be taken into account. This is true when the building is occupied, but many buildings are unoccupied for months at a time and nearly every basement has large unoccupied spaces. However, we can assume that a basement will have goods piled in it in a number of places and that no unoccupied space will be more than twenty feet across. This gives a span of twenty feet on which the upward pressure will be exerted. It is exactly like a floor turned upside down. The barrels and boxes on the floor may be assumed to act like columns and walls under a floor.

Thickness of Slab.

For plain concrete the moment factor may be taken as equal to 75 when the concrete is on the verge of failure. The thickness of a slab will be found by the

usual formula for the resistance of rectangular beams, that is,

h = the square root of M divided by $75 \times b$
 in which h = total thickness of floor slab
 M = bending moment in inch pounds
 75 = moment factor
 b = breadth in inches, usually assumed at 12.

The bending moment is found by the formula,
 M = weight per sq. ft. $\times$ the square of the span divided by 8.

For an example we will consider a pressure upward equal to a head exerted by three feet of water so that the pressure = $3 \times 62.5 = 187.5$ lbs. per sq. ft.

The span is 20 ft., so the example is worked out as follows:

$$\frac{187.5 \times 20 \times 20}{8} = 9375 \text{ ft. lbs.}$$

As the moment of resistance is in foot pounds we multiply this by 12 and get 112,500 inch pounds. Since the width we assume for a strip of floor is 12 inches we could use 1 for the value of b in the formula for resistance and use the bending moment in foot pounds.

Now to use the formula for resistance. First we will use the moment in inch pounds and a width of 12 inches. Multiply $75 \times 12 = 900$, and dividing the bending moment, get $112,500 \div 900 = 125$. Extracting the square root the thickness of the slab is found to be 11.2 inches.

If we used the bending moment in foot pounds the process would be as follows: $75 \times 1 = 75$ and the bending moment $9375 \div 75 = 125$ as before, the square root being 11.2 inches.

By the foregoing calculations we have found the thickness of a slab of concrete which will sustain an upward pressure of 187.5 lbs. per sq. ft. and be on the verge of cracking. The operation is similar to the process for ascertaining the thickness of a floor to carry a load of 187.5 lbs. per sq. ft. but with this big difference: the floor must in addition to the live load carry its own weight. The pressure being from below upward on the cellar floor the weight of the floor gives a factor of safety. Assuming the weight of one inch thickness as 12 lbs. the weight of one square foot of the floor is $11.2 \times 12 = 134.5$ lbs. Such a floor will be all right and some approved waterproofing compound may be used to make the concrete impervious.

To lay such a floor several holes should be dug to a depth of one or two feet below the floor bottom into which to drain the water, and pumps should be used in these holes to keep the water down until the concrete has set. When the work is completed and the concrete is fully set, the holes should be lined with two or three layers of tar paper coated with hot asphalt, like laying a two or three-ply roof, and then the holes quickly filled with an extra rich mix of concrete containing waterproofing. Over this concrete should be placed paper and boards, and on top place weighty goods or earth, etc., to afford sufficient weight to more than balance the upward pressure, until the concrete sets. It is a very good idea to place under the whole floor a two or three-ply layer of asphalted paper or

burlap to keep the water from getting into the concrete, and then place a rich mix of mortar on the paper before depositing the rest of the concrete. The concrete used in such floors should be a dense mix, fully equal to a 1:2:4 of cement, sand and stone, or gravel.

Keep Weight on Floor.

This calculation was made for a floor having a clear space of twenty feet between piles of goods, but as it has a factor of safety due to the weight of the floor there may be times of high water when larger spaces may be left. It is a good policy during times of high water to have extra loads on all cellar floors. The writer has noticed a great many times that during periods of high water owners of buildings having basements likely to leak will remove all goods from the cellar, thus creating the worst possible conditions. If the floor is tight and the goods are left on it the factor of safety against cracking is greatly increased.

In the case of a reinforced concrete floor, we will assume the average total strength of the sort of concrete used in a cellar floor and the elastic limit of the steel. The moment factor is 420. The steel ratio = 0.015, or what is called, one and one-half per cent.

The bending moment in foot pounds is as before, 9375, and the width of our slab one foot. Then $9375 \div (420 \times 1) = 9375 \div 420 = 22.35$ and the square root = 4.7 ins. As the steel should be laid with a covering of not less than one inch of concrete we will make the thickness an even six inches. The steel is of course laid on the upper side, for the pressure is from below. The area of steel required per foot in width = $12 \times 4.7 \times 0.015 = 0.85$ sq. in. Small bars should be used here as the bond stress will be great. The reinforcement should be in two directions, the bars crossing. While the calculations were based on a medium steel it will be best to have deformed steel, and a square twisted bar will answer all requirements. Place the bars three and one-quarter inches apart in two layers, one running the length of the cellar and one across the width. First place tar and asphalt layers and on this a rich mortar. When the total thickness of concrete and mortar is five inches place the steel and then cover it with the rich topping wearing surface, keeping the pumps going all the time until the concrete has set.

The under lining of paper and asphalt, being the same for both floors, may be excluded from a comparative estimate of cost. Counting the cost of one inch of concrete at two and one-quarter cents per foot square the cost of the floor will be, for the concrete, $11.2 \times 2.25 = 25.2$ cts. per sq. ft. The second floor is only six inches thick and the cost will be $6 \times 2.25 = 13.5$ cts. per sq. ft. The steel will weigh $0.89 \times 3.4 = 3.03$ lbs. per sq. ft. and at two and one-half cents per pound in place, the cost of the steel will be, $3.03 \times 2.5 = 7.58$ cts., making the total cost of the floor per square foot, $13.5 + 7.58 = 21.08$ cts. The saving in cost of the reinforced concrete floor over the plain concrete floor is about twenty per cent. Having figured, as in the first case, on the floor being on the verge of destruc-

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Five- and six-room detached dwellings at Gary, Ind.; roof of tin; all walls, partitions and floors of concrete; exterior walls 8" thick, inside partitions, 4" floors, 6 5/8". Exterior walls had not been given stucco coat when the photograph was taken

HOUSES OF PRACTICALLY ALL CONCRETE BUILT SATISFACTORILY AT GARY.

There is no house-building enterprise in concrete of more general interest than that being conducted at Gary, Ind. by the American Sheet & Tin Plate Co.

Although there are numerous types of dwellings each of them is practically an all-concrete building, poured in Reichert metal forms,* and given an exterior stucco finish. In the June, 1911, issue of CONCRETE working drawings of one type of Gary house, a four-flat building, were produced. At that time the work had really not progressed far enough toward the proposed 200 houses to make it possible to say definitely just how successful the work would be, judged from the various angles considered in such an undertaking where capital decides to invest large sums of money in homes for factory operatives and to determine the first cost and the ultimate value of a comparatively new method of building.

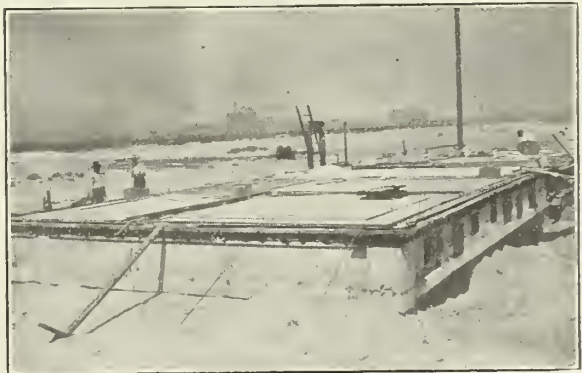
Those already convinced of the value of concrete for such purposes felt sure that the enterprise would be a success. The same methods had been used successfully elsewhere. Yet investors look at such things sometimes differently, particularly in such wholesale work, and it is necessary not only to demonstrate economy in the long run in the use of a certain material and methods but to show also that the first cost compares favorably with the first cost of construction in other materials. In a wholesale enterprise of this kind, where the same equipment would be used continuously on a long job within a comparatively small area it was believed possible to demonstrate that concrete construction—even very good concrete construction, the end which would be attractive dwellings—could be made to show a very low cost.

Cost Details Not Available.

Detailed cost figures are not available, it is regrettable to say, yet in this report of progress there are several facts which point strongly to a gratifying attainment not only in cost but in appearance. The illustrations give an idea of what kind of buildings these are at Gary. Certainly the detached houses



Preparing to set forms on basement floor for type A. A. house



Basement floor poured



Type A. A. house practically complete

*Reichert Mfg. Co., Milwaukee, Wis.

are way ahead of the cottages which ordinarily are built for factory operatives and yet is reported that they cost but \$2,800 each.

The terraces present no such dreary aspect as do most buildings erected for like purpose. They are attractive and the finished work is sure to make a most satisfactory appearance..

With fourteen buildings, furnishing separate accommodations for 74 families, almost complete, considerable progress has been made.

The building already erected and now being finished are representative of six types of dwellings, the number of houses and their classification being as follows: Three of Style E; three of Style F; three of Style B.B; two of Style C.C; two of Style A.A; one of Style D.D

As a further classification the following list gives an idea of the work:

Styles E. and F.—Two story detached houses—average price approximately \$2,800; six rooms, bath, complete. Fireplace, dining buffet and mantel piece of concrete. Four of the six houses have concrete floors; two have wood flooring. All are plastered directly on the concrete, the original plan of the company to sand finish and calcimine the walls and ceiling having been altered. The plumbing in these six structures averaged about \$283. They are expected to rent at from \$20 to \$25 a month.

Style B.B.—Ten-terrace houses, six rooms in each apartment, two stories. Approximate cost \$16,000. Wood floors to be used throughout. This style of building approaches very closely the Philadelphia house, except that it is different in arrangement.

Style C.C.—Ten-terraced houses, similar to the B.B. Style, but different slightly in materials in fire-walls and parapets. Approximate cost several hundred dollars less than style B.B.

Style A.A.—Four-apartment buildings: two apartments of three rooms, two of four rooms. Cost of these houses approximates \$6500 and is considerably cheaper than cost of similar buildings composed of brick or stone. This type was shown in complete drawings in CONCRETE in June last.

Style D.D.—Three-story, ten-terraced building, nine rooms in each apartment. This building, which is the largest of the group is now in its second story stage. Its estimated cost will run above \$20,000.

Figures showing detailed cost, such as foundation walls, floors, roofs, damp-proofing, plastering and painting, are not obtainable from local officials of the company. Much of the material is manufactured either by the Tin Plate company or some other subsidiary of the steel corporation and these figures have not been made public.

Extra Excavation Cost.

Excavating in sand has cost about 35 cents a yard and this cost was increased over ordinary figures by the fact that much of the sand blew back into excava-



Terraces under construction



Terraces nearly complete



Close view of five- and six-room detached houses after application of stucco

tions which had been left standing throughout the summer. This detail for the detached concrete houses, whose excavations measure 22'x37'x4' 6", amounts to about \$47.50.

Several changes have been made in the plans, owing to more economical materials or methods. Atlas composition floors will be used in several houses instead of concrete flooring. Changes have also been made in cornices and gutters, it is understood. A number of alterations have been made in connection with roofing, as well.

The only thing in the nature of an experiment at Gary so far as the use of the metal forms is concerned was in the use of these forms in making concrete floors. Concrete floors and girders were adopted for some of the houses, and it is reported that the labor cost on the floor forms, including shoring and removing and cleaning plates was two cents per square foot of form. For walls this form work costs it is said but one cent per square foot.

It is not at all surprising that in so large an undertaking some plans as first made should be changed somewhat as the work progressed. Yet in general the entire project is working out satisfactorily, not only in manner of construction but in cost figures, which in the main are below those of similar buildings constructed of brick and wood—fireproof houses for less than burnable ones. The large equip-

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Edison Has Invented Concrete Furniture for the Poor Man

—Thomas in *Detroit News*.

THE IDEA OF FURNITURE MADE OF CONCRETE REALLY ISN'T JUST A JOKE.

BY A. A. HOUGHTON.

Thomas A. Edison's recent announcement that furniture will be made of concrete inspires the newspaper fun-makers, so that we may all laugh. Yet it is very possible that some of those who enjoy the mirth-provoking point of view will gladly place furniture made from concrete in their homes within the next decade.

The idea, as advanced by Mr. Edison, is not new. Over a year ago the writer advocated in the cement journals the use of concrete for some articles of home furnishings, and, while he cannot claim to be the inventor of this idea, yet he believes that many articles of household furniture can be made successfully and practically of concrete, to give good, or even better, service than those of materials now commonly used.

The average mind associates concrete with rough stone walls and foundations, losing sight entirely of the fact that most beautiful and elaborate designs are cast in this plastic material. This wrong estimate of the value of concrete can be changed only by educating the public mind to the true value of this material—the many things possible to attain in its use, that at first thought seem impossible and ridiculous.

The form illustrated in Fig. 1, which may be employed as a pedestal or as an umbrella stand, shows one way to the practical employment of concrete for articles of household furniture. Cast stone is impractical as we have the excessive weight, so

aptly illustrated in the cartoon reproduced above, but light reinforced concrete, made possible by the plastering system of molding, is fully as practical for hundreds of articles as other materials now used.

The wire cloth or expanded metal lath is cut into an outline of the work to be molded, planning so that this metal form is one inch smaller than the perfected work is to be made. The metal reinforcing or form is made as rigid as possible, then the concrete is put on with a trowel—a simple operation that any one may very easily accomplish who has had experience in concrete work.

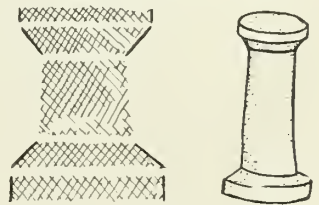


Fig. 1

This makes the walls of the work not more than an inch thick, and in many cases they may be made one-half inch in thickness, thus making work fully as light as though made of other materials.

Fig. 2 shows the possibility of molding an easy chair of reinforced concrete by the plaster method, making it practically as light, and fully as strong as if made of solid oak.

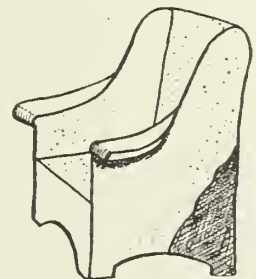


Fig. 2

In Fig. 3 is shown a library table, possible by the plaster method, employing expanded metal for a

form. Such a table will be of about the same weight as if constructed of solid oak, and, when made of marble concrete, neatly "veined," there cannot be the least objection to such a table from the view-point of practicability as well as beauty, while from the hygienic view-point the marble table is far in

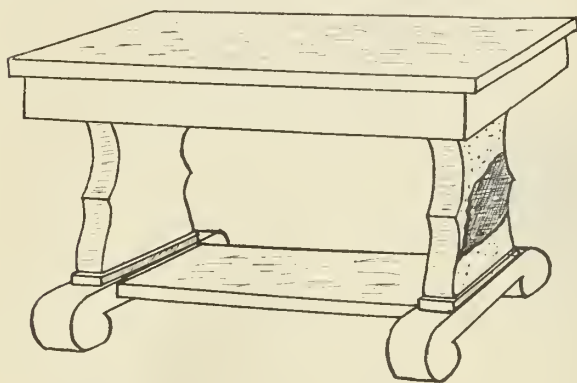


Fig. 3

advance of present day material for table construction.

Fig. 4 shows a lavatory and a kitchen sink. Cutting the wire cloth or expanded metal lath to the form desired is a simple matter; then, by plastering the marble concrete upon this form, a piece of work is perfected which is light and strong and has graceful and pleasing lines. Where the design overhangs,

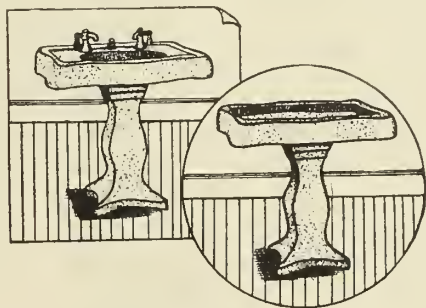


Fig. 4

the mortar must be put on in several coats, placing each successive coat before the previous one has had time to set. This avoids trouble which would follow an attempt to place the entire plaster coat in one application. The finishing is very easy, as the mortar gives ample time for that by reason of its slow setting properties. Brushing the surface with water as you finish is the only requirement to secure a symmetrical surface.

The use of a rubbing brick upon the surface after the work is cured is of value, using the coarse brick upon the wet surface first, then finishing with the finer grained brick for the final polish, and, lastly, rubbing well with a felt dampened with oxalic acid. The results are never in doubt when ordinary care is used.

The illustrations will suggest to the ingenious worker many ways in which to use light reinforced concrete in carrying out various similar ideas.

LABORATORY OF LEHIGH UNIVERSITY HAS WELL-EQUIPPED CONCRETE SECTION.*

BY FRANK P. McKIBBEN.†

The Fritz Engineering Laboratory, presented to Lehigh University by John Fritz, Bethlehem, Pa., to enable the students of that institution to study experimentally various problems connected with the materials of construction and hydraulics, is well equipped for concrete testing. There are four main sections in the laboratory, as follows:—1, a general testing section, including the testing machinery and a small machine shop; 2, a room for testing cement; 3, a room for making and storing concrete specimens such as beams and cylinders; and 4, an hydraulic section.

The laboratory building is of the steel mill building type, 91' x 114', with a main center aisle between the steel frame carries the roof and the traveling crane only, the side and the end brick walls being carried on independent foundations. The problem to



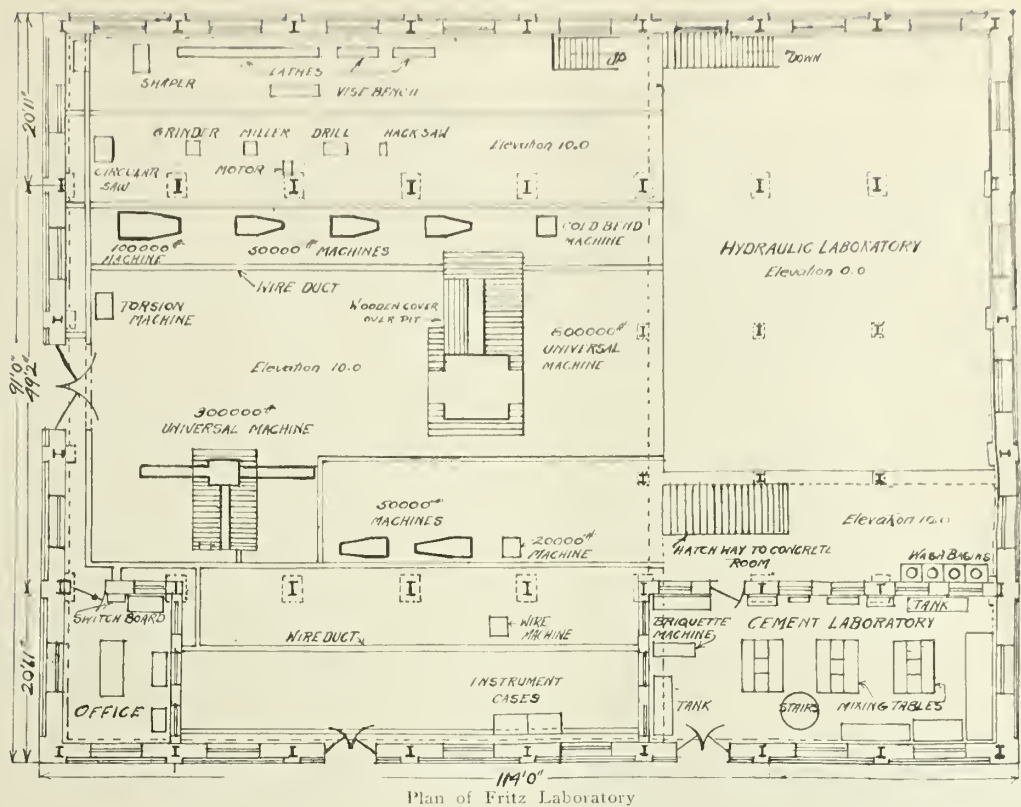
Cement Section

to solved in planning the building was to secure a structure of sufficient height to accommodate a vertical screw testing machine capable of taking a specimen 24' long, to secure at least two levels for the hydraulic laboratory, and to have concrete and cement rooms, which while in close proximity to the main testing room, could be separated therefrom at any time in order to prevent dust from passing into the main room. At the best, cement and concrete laboratories are dusty and should not be placed where there are testing machines.

As ample light is of prime importance in a testing laboratory, numerous windows are provided in the side walls, end walls and in the clear story, and a skylight 9' wide and 84' long is placed in the north roof over the main aisle. Steel frames with movable sections are provided for all side and end-wall windows. The main aisle is 49' 2" center to center of crane columns and this width affords sufficient clearances on the sides of the large testing machine which stands practically in the center of the building. A less width for a vertical machine of the size used is not advisable. In fact, the larger

*Portion of paper read before American Society for Testing Materials.

†Professor of Civil Engineering, Lehigh University.



the proportion of area commanded by the traveling crane the better, but if side aisles are used they should be at least 20' wide. The section set apart in the east end of the building for the hydraulic

tory, a large torsion machine and an impact machine and after these have been installed there will be ample room for future growth. Table 1 shows the floor areas of the various sections:

TABLE I. FLOOR AREAS OF SECTIONS IN FRITZ LABORATORY.

Section	General Testing	Cement	Concrete	Hydraulic	Office	Total
Floor areas in square feet.....	6772	840	1320	4212	250	13394
Clear Height in feet....	40 and 20	12	9.5	20 and 20	12	

TABLE II. TESTING MACHINES IN GENERAL TESTING SECTION

Type of Machine	Capacity lbs.	Speeds Inches per Minute		Nominal Horse-power of Motor	Speed of Motor R. P. M.
		Max.	Min.		
Universal.....	800,000	8	.05	20	1120
".....	300,000	3	.021	7.5	1120
".....	100,000	4	.04	3	1700
".....	50,000	3	.38†	2	1120
".....	50,000	3	.38†	2	1120
".....	50,000	3	.38†	2	1120
".....	50,000	8	.05†	2	1120
".....	50,000	8	.05†	2	1120
Tension and Compression.....	20,000	..	..	Hand-power	
Wire Tester.....	200,000	..	..	Hand-power	
Cold Bend.....	1.5 in. Diameter bar	..	..	2	1700
Torsion.....	24,000*	..	..	Hand-power	

*Inch pounds.
†Hand power also available.

The general testing section contains all testing machines except the briquette machines which are in the cement section. It is so arranged that classes can be divided into small groups of three or four students each, and each group provided with a machine with which to conduct tests. Occupying the western portion of the main aisle which is served by the crane and which is connected to the exterior by a doorway 10' wide this general testing section is well arranged to facilitate the handling of large or heavy test specimens; for example, wagons carrying



Testing 20' Reinforced Concrete Column

laboratory occupies, in addition to the depressed area, 39' x 54' (10' below the main floor level) an elevated platform of the same area 10' above that level.

Sufficient floor area has been provided for additional equipment such as a road-materials labora-

steel or concrete beams or columns to be tested are drawn into the building through the large doorway and their loads removed by the traveling crane. This crane has a span of 47' 2" center to center of runway beams, is operated by three D. C. motors, and has a safe capacity of 10 tons. In planning a laboratory in which tests on large specimens are to be made it is very important that rapidity and ease of handling should receive proper consideration, and for ordinary tension, compression and shearing tests a traveling crane is of greatest importance.

Equipment in General Testing Section.

The 800,000 pound machine is of the two screw vertical type capable of testing a column of 24', a tension specimen of corresponding length or a transverse specimen 10' long or less. The clear distance between the screws is 35". Although the weighing table is only 10' 6" long it is possible to test beams up to 25' or 30' in length by using extension girders on the weighing table.

The 300,000-pound machine is very sensitive and accurate and its slow speed makes it useful for general testing. Its extension arms on the weighing



Reinforced Concrete Columns in General Testing Section

table are 21' long, so that a beam up to practically this length can be easily tested under a load not exceeding 300,000 pounds. The top surface of the weighing table and of the extension is 2' above the main floor and this height has proved satisfactory.

The smaller universal machines are used not only for ordinary tension, compression and shearing tests, but also for transverse tests by placing the test specimens on Bethlehem "H" sections laid on the weighing tables, the "H" sections thus serving as extensions to the weighing tables.

The repair shop equipment consists of one drill press, one high speed lathe, two metal turning lathes, one milling machine, one shaper, one circular saw, one power hack-saw and one grinder. All of these machines are belt driven, the power being furnished by a 7½ h. p. motor.

All electricity for lighting the building and for driving the testing machines is 2-phase, 60-cycle, alternating current at 110 and 220 volts, respectively, and is supplied from the University power station. Direct current, obtained from a local company, is

used for the traveling crane and for this purpose is to be preferred to alternating current, and, except for the tendency to spark, the former is better for testing machines because of better speed-control. However, if the gearing on the machines is properly arranged to provide for a very slow speed of, say, .05 inches per minute, a rapid speed of 8 inches per minute and at least one intermediate slow speed, the alternating current is perfectly satisfactory for ordinary universal machines, and in the present instance was the only kind obtainable from the university station without the use of a rotary-converter. To drive centrifugal pumps for an hydraulic laboratory water supply, direct current is much to be preferred and, although a variable-speed induction motor can be obtained, yet the possible variations in speed are limited to such a narrow range, as to prevent that nicety of speed-control obtainable with a D. C. motor. With proper gearing, therefore, either alternating or direct current can be used for ordinary testing machines, but direct current should be used for hydraulic laboratories and for certain classes of testing machines. The motors of 20 h.p., 7½ h.p., and 7½ h.p., for driving the 800,000-pound machine, the 300,000-pound machine and the tools in the repair shop, respectively, are furnished with auto-starters. The motors for the hydraulic section have not yet been installed.

Cement and Concrete Sections.

The cement testing section occupies a separate room on the main floor, and is so planned that twelve students can work at one time. The equipment of this section consists of well arranged tables for making cement specimens, the ordinary storage tanks, briquette testing machines and all apparatus necessary for making standard cement tests.

All concrete specimens, such as beams, cubes, and cylinders, are prepared in the concrete room, which covers not only the entire area under the cement room but also extends beyond this area and underneath a portion of the main testing room to which it is connected by a large hatchway through which the heavy concrete specimens, such as beams, can be hoisted into the main testing room with the aid of the traveling crane. The equipment in the concrete section consists of a mixer, the necessary bins for sand and stone, and molds for beams, cylinders and cubes.

An important feature in a cement and concrete laboratory is a proper drainage system arranged to prevent pipes from becoming obstructed by cement or sand. This problem has been solved by placing under the concrete room a large concrete sump into which all drainage must flow and in which there is a partition or weir over which the water passes, the sand, cement and other matter being caught in the sump whence it is easily removed. This arrangement is satisfactory.

This laboratory has been built and equipped under the personal supervision of Mr. Fritz, by G. A. Chandler, associate professor, L. D. Conkling, S. H. Ingberg and the writer, and is a part of the Civil Engineering Department of the University.

WORKING DRAWINGS FOR SQUARE HOUSE OF CONCRETE BRICK AND SHINGLES.

A square colonial home of concrete brick and with stained shingles for the second story can always be made very attractive and still be erected at moderate cost.

A square house admits of a good arrangement of rooms, and this design is 36' wide and 28' 6" deep in the main portion, the kitchen extending back 12' further. These dimensions do not include the porches.

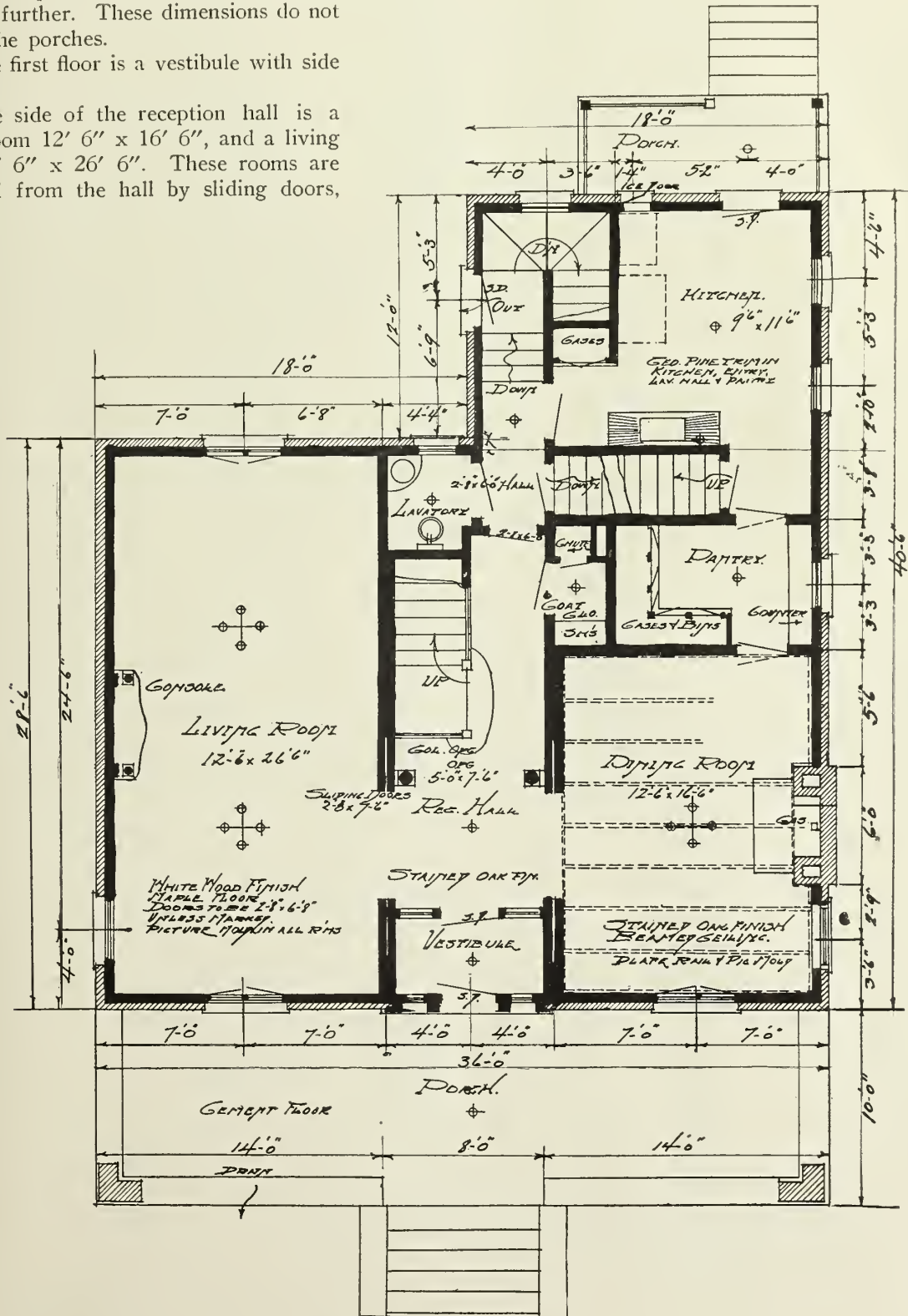
On the first floor is a vestibule with side lights.

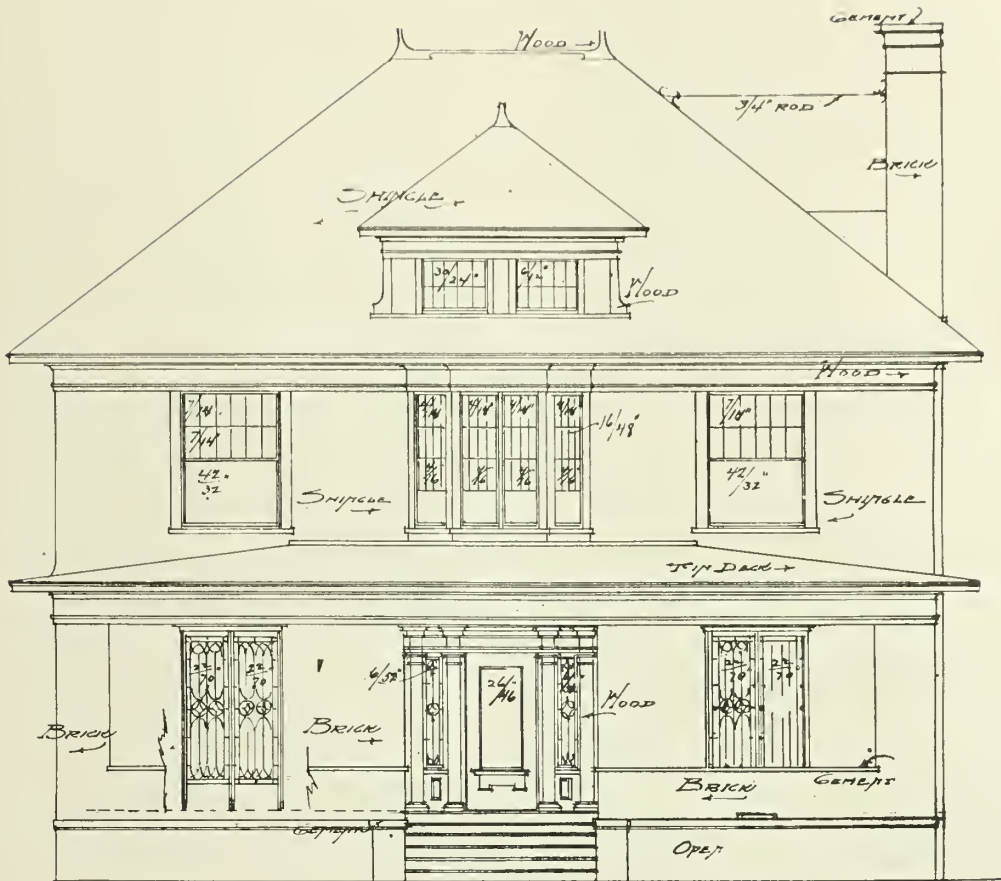
At one side of the reception hall is a dining room 12' 6" x 16' 6", and a living room 12' 6" x 26' 6". These rooms are separated from the hall by sliding doors,

doors, and between the reception hall and the stair hall are colonial columns.

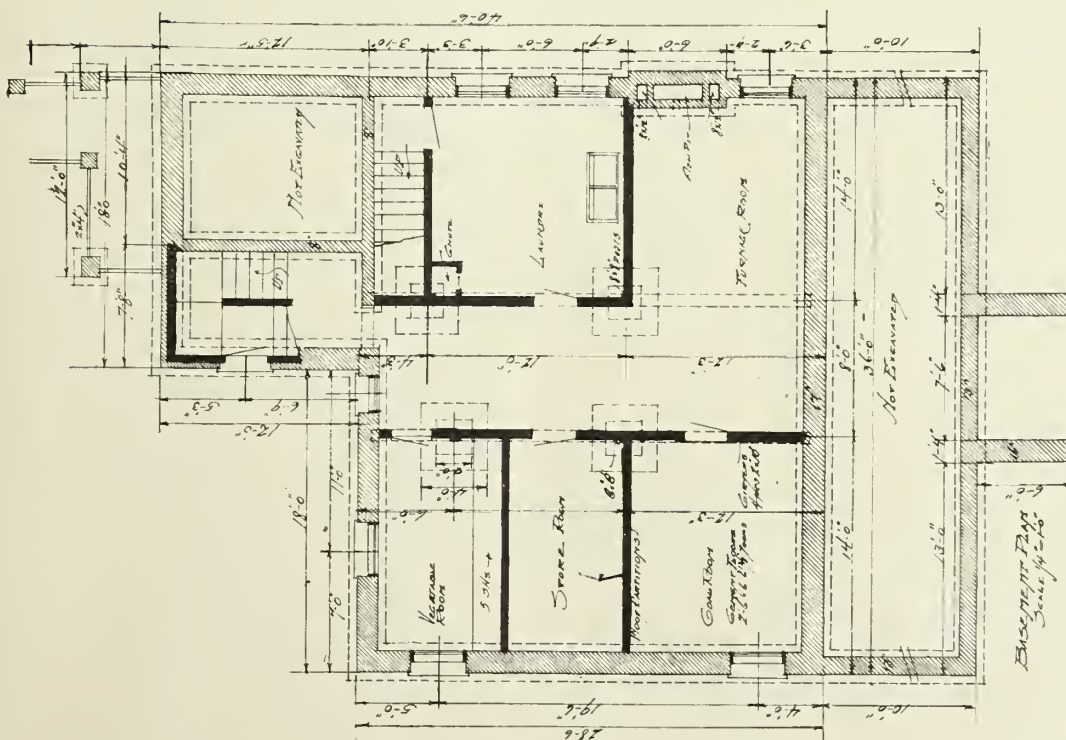
The lavatory and closet are under the stairway, with a convenient coat closet and clothes chute off the hall. Between the dining room and the kitchen

(Continued on page 46)

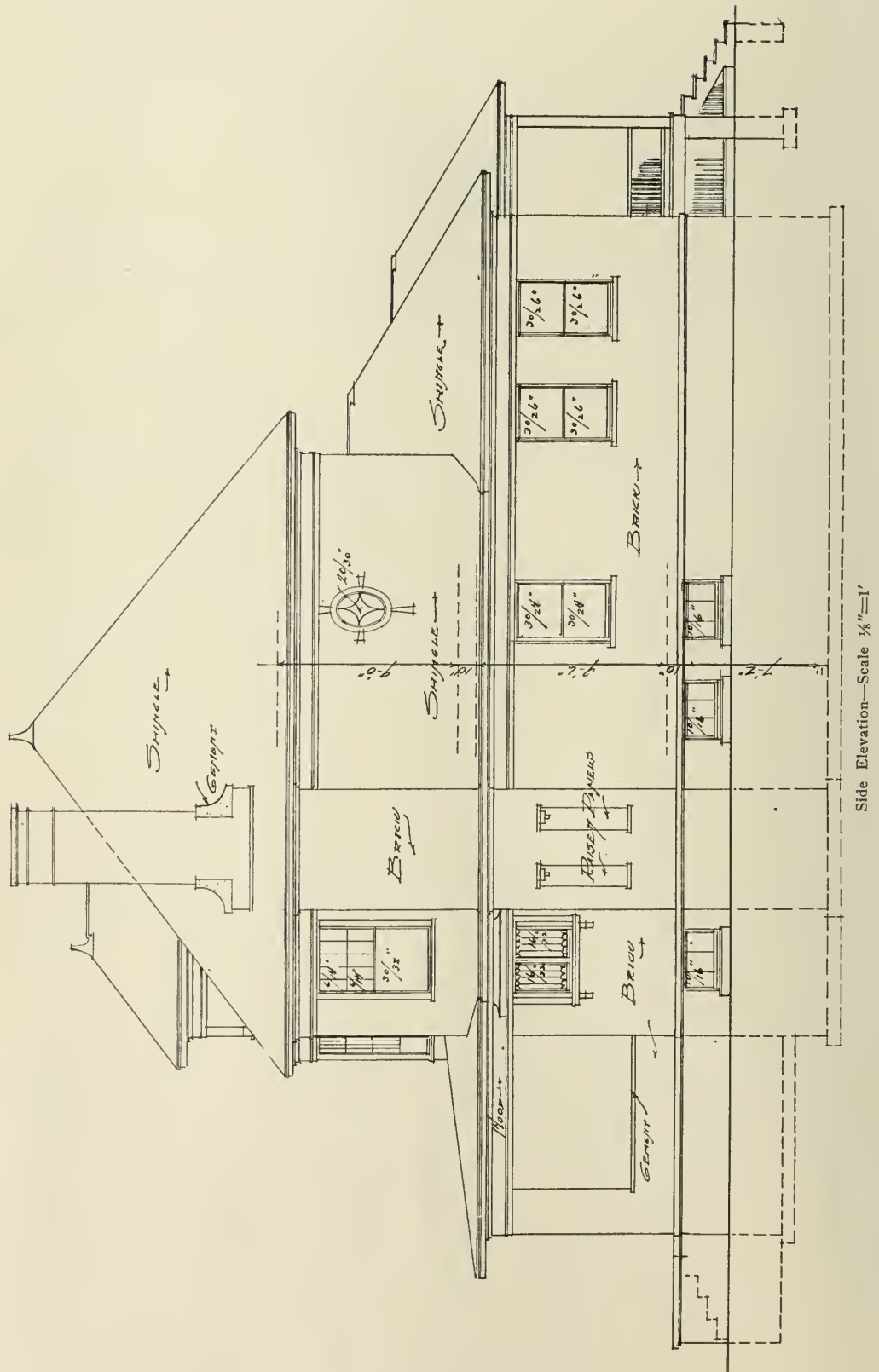


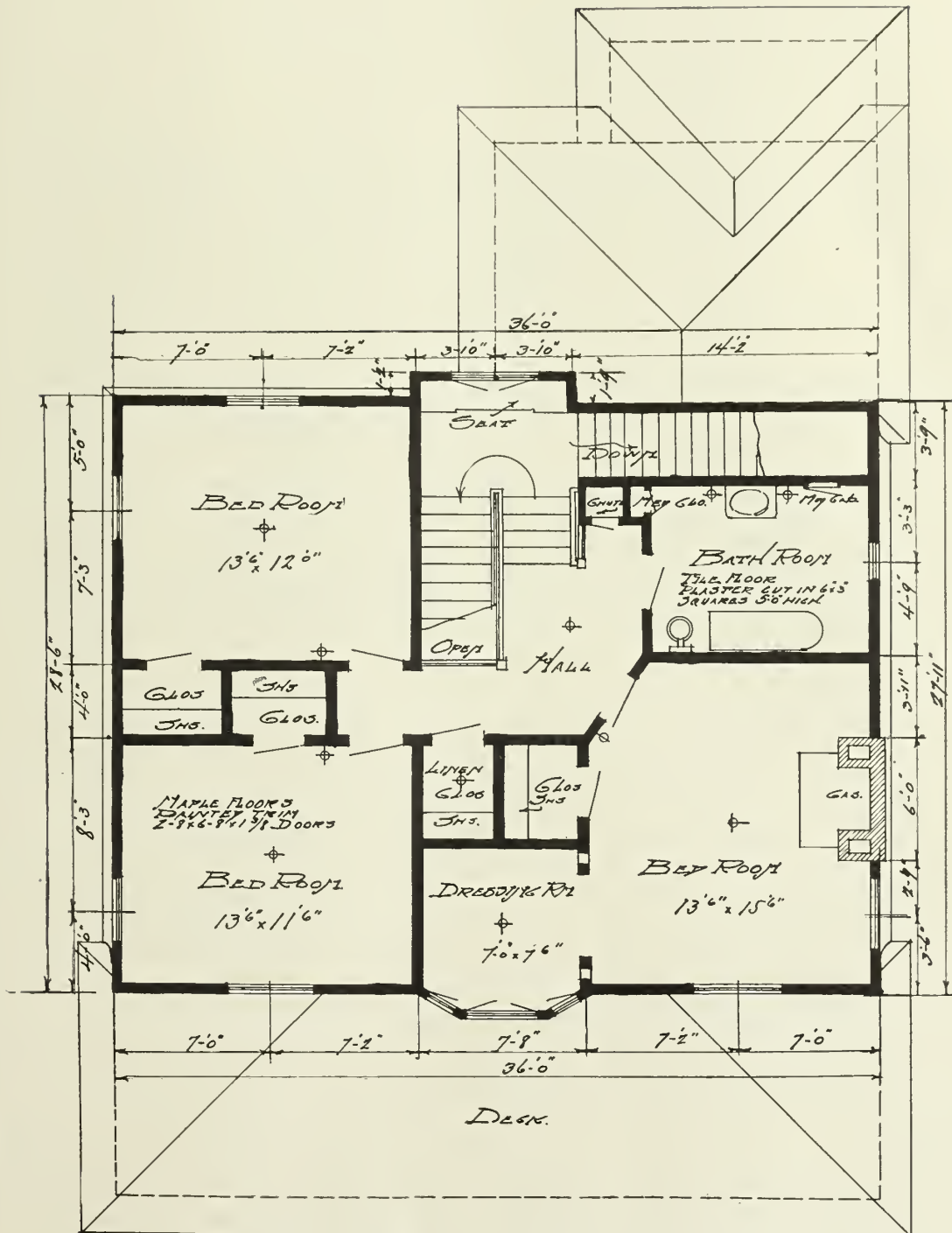


Front Elevation—Scale $\frac{1}{8}"=1'$



Basement Plan—Scale $\frac{1}{12}"=1'$





Second Floor Plan—Scale $\frac{1}{8}"=1'$

NEW DESIGN FOR REINFORCED CONCRETE TRACTION POLE.

A concrete pole for trolley service has been designed by Stone & Webster Engineering Corporation. The form work necessary, reinforcing and so on, are fully explained in the drawings which are reproduced. The pole requires 1 cubic yard of concrete and 160 lbs. of reinforcing steel. It is made of a mixture of 1:1½:3 concrete, the larger aggregate consisting of ½" crushed rock. The mix is made very wet and poured into the form, then troweled thoroughly. Forms are removed after four days and the pole is allowed to cure for 25 days more.

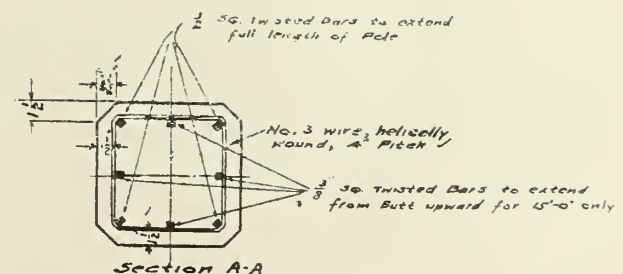
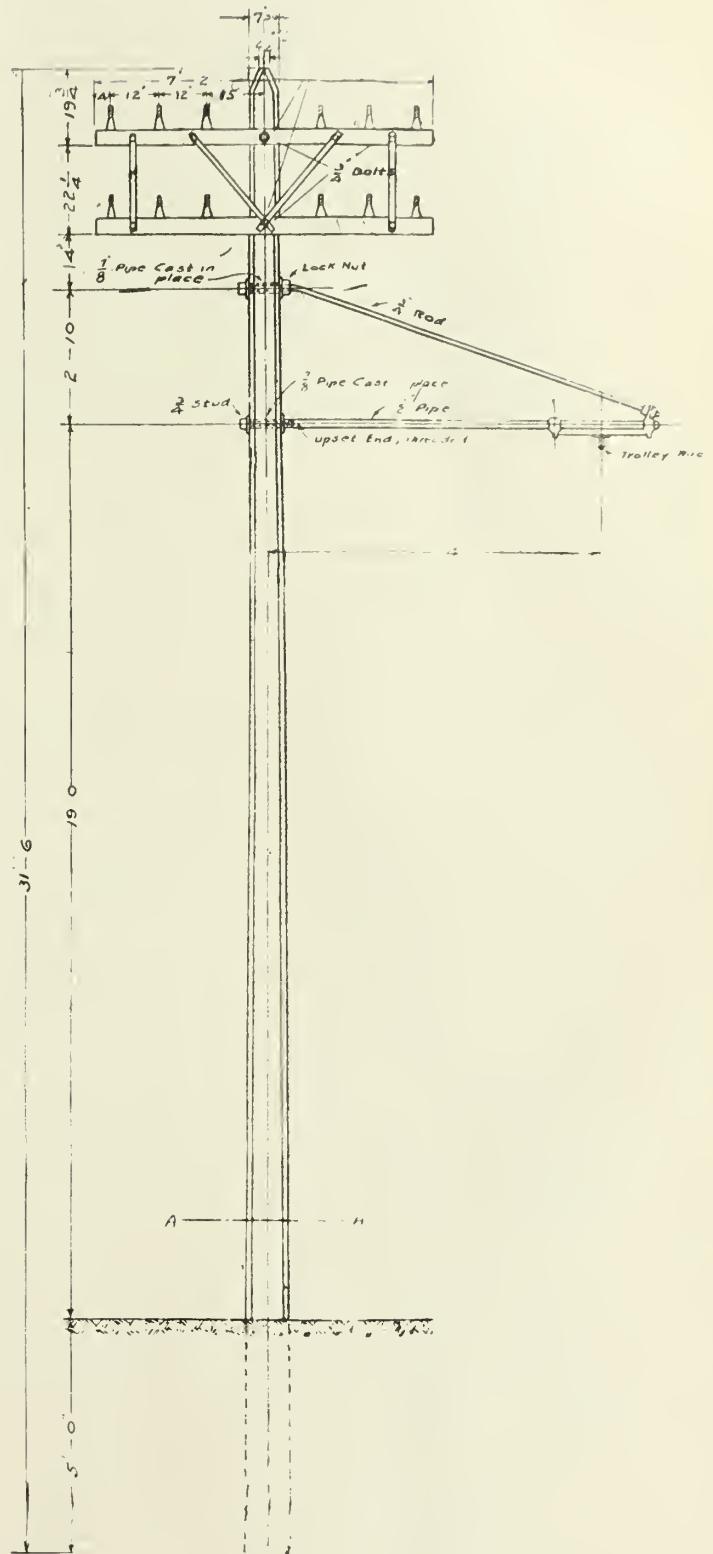
Commenting upon the pole W. J. Donnelly, engineer with the company, El Paso, Tex., writes: "Considering the pole as a cantilever beam, the greatest bending moment comes at the wind and water line and decreases toward the top. The bending moment reaches rather severe proportions when the poles are placed on sharp curves, hence the advisability of the four ¾" square twisted bars which extend from the butt 15' upward. We believe that trolley service offers a very severe test on poles as aside from the structural strain and wind load there is always danger of shock from a flying trolley. Referring to the forms you will note that two poles are cast at one time, a board separating them. The form cost for two poles is very little more than for one. The pole has not yet been tested in actual service."

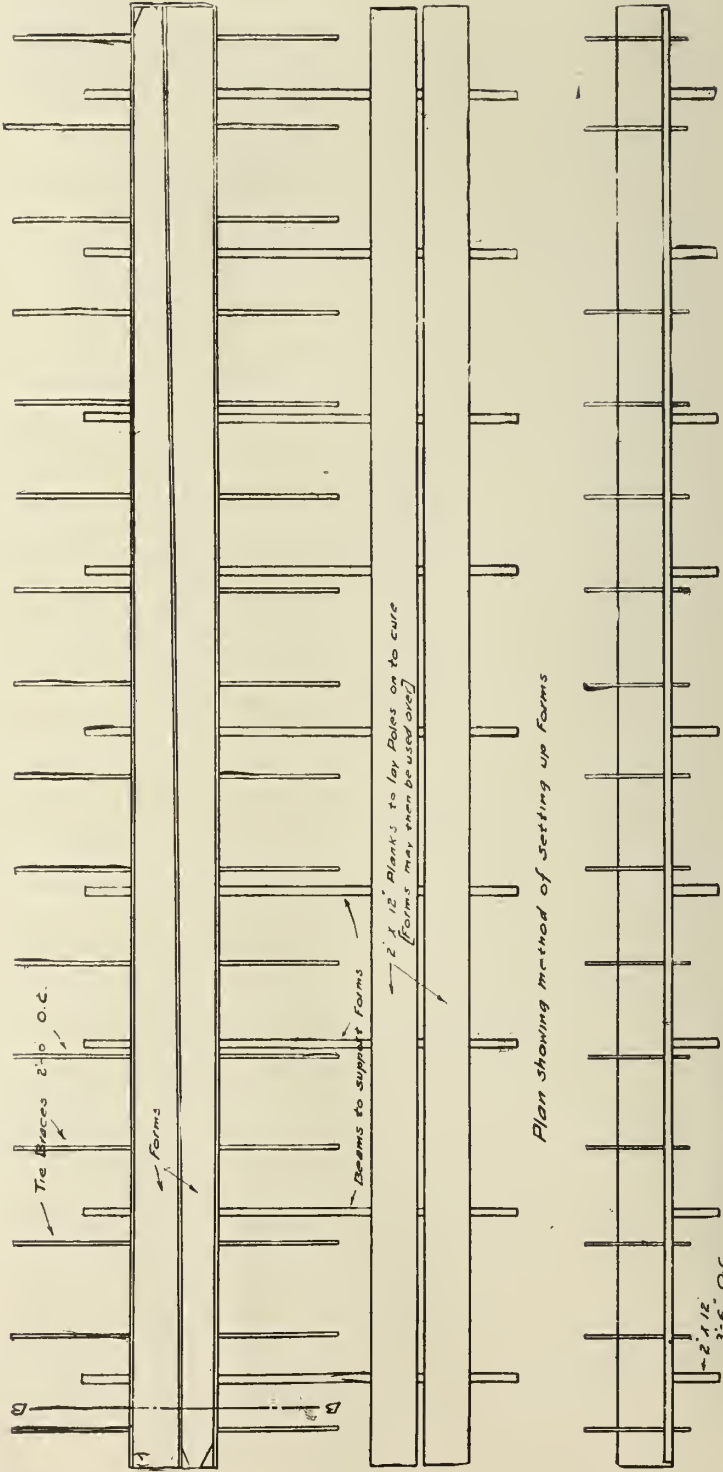
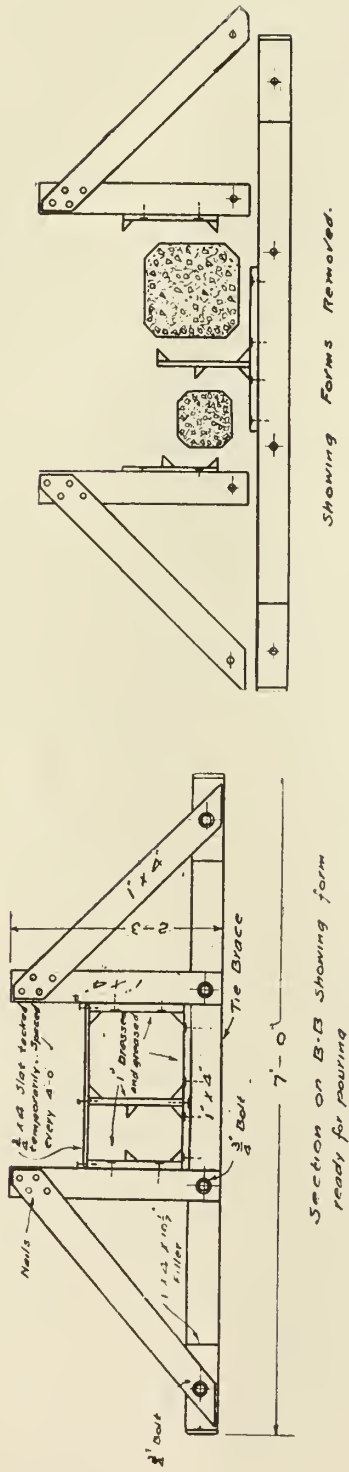
UNIT COSTS OF CONCRETE BUILDINGS OF VARIOUS TYPES.

Approximate unit costs of reinforced concrete buildings of various types are estimated by Lockwood, Greene & Co., architects and engineers, Boston, as per the figures in the table below. The company has had large experience in this line and the data are of more than usual value:

Type of Bldg.	Dimensions	Live load per sq. ft.	Cost above fdtn. sq. ft.	Cost above fdtn. cu. ft.	Costs inc. fdtn. sq. ft.	Costs inc. fdtn. cu. ft.
Mch. Shop	120 x 50 4 sto.	150#	\$1.05	\$0.08	\$1.17	\$0.09
Mch. Shop	220 x 100 1 sto. sawtooth skylights		1.65	0.09	1.75	0.10
Cartridge Factory	223 x 56 2 sto.	300#	1.40	0.09	1.55	0.10
Cotton Mill	550 x 129 2 sto.	75#	0.99	0.07	1.06	0.075
Weave Shed	341 x 231 1 sto. sawtooth skylights	125#	1.66	0.064	1.79	0.07
Power Ho.	90 x 62		2.53	0.115	2.67	0.12
Store Ho.	181 x 56 4 sto.	150#	1.08	0.065	1.15	0.07
Store Ho.	256 x 100 12 sto.	150#	0.90	0.09	0.98	0.105
Store Ho.	223 x 56 2 sto.	300# and 1000#	1.20	0.08	1.35	0.09

Coal pockets above 3,000 ton capacity cost from \$6.00 to \$7.50 per ton. Reinforced concrete stand pipes above the foundation cost from 2½ to 3 cents per gallon.





Elevation
Forms for Reinforced Concrete Pole—See page 47.



Placing Concrete on Mission Bay Viaduct, San Francisco

POURING CONCRETE BRIDGE FLOORS BY A NOVEL METHOD. ECONOMICAL CONCRETING IN MISSION BAY VIADUCT CONSTRUCTION.

In the construction of the main viaduct of the McAdoo Tunnel extension into Newark a very interesting method was used in pouring concrete bridge floors which are trough-shaped and each 13' wide, 11½" thick, and laid in sections 250' long with expansion joints between.

The forms are built complete several hundred feet in advance of the concrete, and the reinforcing steel is set and tied by the force of the steel contractor before a run of concrete is started. Concrete is then placed by two traveling plants on the deck of the viaduct. One consists of a 7' gauge car carrying a 1-yd. Ransome mixer and timber feeding bins.

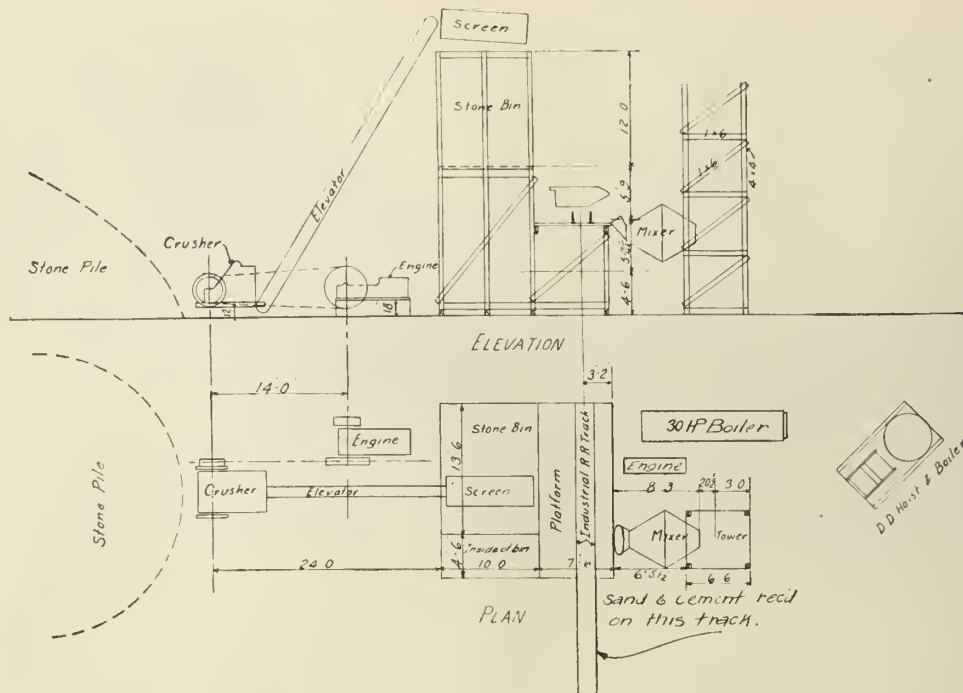
It runs on a temporary track, at one side of the slab which is being placed. This track has three rails to accommodate standard-gauge and the 7' gauge. A locomotive crane on the track accompanies the traveling plant and supplies its bins from material cars standing on one of the outer freight tracks below. Concrete is delivered from the mixer to any part of the slab on the opposite half of the viaduct by a sectional chute, and is tamped in place by the concrete gang. Under this plan of operation 250' of single track slab is placed in an 8-hour day and at times two sections, or 500', have been laid, the time required being 14 hours. On a part of the work, in placing the second track-slab, a second mixing plant was installed, consisting of a mixer on a flat car, with the material cars coupled at the ends. This traveling plant moves over the completed first track and operates similarly to the other described.

There is every indication that this method of pouring bridge floors is thoroughly economical and efficient, and these two traveling mixing plants are well worth the study of contractors anticipating this kind of work.

Similar in some particulars to the method of handling materials on the McAdoo tunnel work in laying concrete bridge floors described on this page, was the plan adopted in building the Mission Bay viaduct in San Francisco. CONCRETE is indebted to Ernest McCullough for the photograph reproduced illustrating this work in San Francisco.

The concrete was mixed on the street below the viaduct where it was easy to get the material and to do all the work. The viaduct floor was built at a height sufficient to permit the usual street traffic to pass underneath and high enough to cross several railway tracks. The sides of the viaduct being plate girders, rails were placed on them on which a traveler, shown in the photograph, ran. On the traveler was laid a light track and through the platform were spouts through which the concrete was dropped. At one end was a hoisting engine which brought the mixed concrete up from the street below and returned the empty bucket. The concrete was dumped from the bucket into a car which traveled on the cross track and which could be turned and dumped into the spouts. With this traveler the cost of concreting was low and there was a minimum of interference with the finishers. The car going across the viaduct could dump the concrete at any point throughout the width of the work and the traveler carried the car along throughout the length of the viaduct as the work progressed.

The Commissioners of Lancaster county, Nebraska, evidently believe in concrete. They put in 52 bridges of the material and 133 culverts also of concrete since last spring when the season opened for road work. Besides these new structures, the commissioners have put concrete wings on thirty-two steel tubes and on twelve tile culverts. Most of the bridges were small, costing from \$150 to \$900 each.



Plant Layout on Penobscot Chemical Fibre Co. Job

DESIGN OF CONCRETE CONSTRUCTION PLANTS FOR ECONOMY.

The three most important of the local conditions which determine the proper character for a concrete construction plant are:

- The layout of the construction work,
- The required output per day, and
- The total quantity of concrete to be placed.

In discussing these governing local conditions, Sanford E. Thompson, consulting engineer, says:

With reference to the layout of the construction work, (a) if a large mass of concrete is to be placed in a comparatively small area, such as in dam construction, it is generally economical to establish a fixed plant, to which the materials may be supplied by gravity or by machinery, and from which the concrete is conveyed to different parts of the work. On the other hand, if the mass of concrete is large, but is distributed over a considerable area, as in a large reservoir, or along a line, as in a sewer or conduit or retaining wall, machinery of a more portable character may be economical. For example, in building retaining walls for railways, where tracking is convenient, a fairly complete plant may be established on trucks or on flat cars to be moved from place to place.

In laying the concrete for the reservoir bottom at Jerome Park Reservoir, New York City, the construction plant as originally designed consisted of one or two central plants from which the concrete was conveyed to place. A thorough study of the conditions showed that a number of small mixers which could be moved from place to place at small expense, were more economical, even disregarding plant cost, than the larger plant involving more machinery and longer transportation of concrete.

The required output per day (b) affects the selection of the size of mixer and governs to a certain

extent the amount of handling and conveying machinery which is economical. A small daily output will not pay for interest and depreciation on an expensive plant. For these reasons hand-mixing sometimes may be cheaper than machine mixing, especially on a structure like a small sewer where the speed is dependent upon the progress in trench excavation.

The total quantity of concrete to be laid in the entire job (c) has an important bearing on the design of the plant, because the total cost of all portions of the plant that are not transportable to a subsequent job must be divided by the number of yards of concrete laid and figured as a portion of the cost per cubic yard of concrete. The different parts of the plant, such as the mixing and conveying machinery, which can be used afterwards, must be provided for in the cost account by a considerable depreciation and interest charge. This, as well as the expense of freight, setting up and moving machinery, and such general items, also must be figured into the cost per cubic yard of concrete.

Because of the failure to include such items as these in government work and force accounts, and even by contractors themselves who do not keep accurate account of costs, the cost of machine mixing is frequently regarded as very low, only a few cents per cubic yard, when, as a matter of fact, the actual plant charges, which are just as real items as the wages paid, will bring the unit costs up to ordinary figures. Writers of descriptive articles frequently fail to include all these incidental charges in stating costs, so as to mislead the inexperienced estimator.

As an example of a compact and economical concrete plant layout there is cited the one erected by the Aberthaw Construction Co. in building eight new reinforced concrete flumes for the Penobscot

Chemical Fibre Co. at Great Works, Maine. Each of these flumes is 58' long, 14' high and 16' 6" wide, and were designed by Hardy S. Ferguson, consulting engineer, New York.

An Economical Plant.

Of necessity, this mixing plant is located out in the river over the tail races which were constructed last year. The sand and cement are brought from the railroad 1,200 feet distant by side dumping cars running on an industrial track that extends above the back of the mixer. The crushed stone is raised by an elevator to the bins as shown and by one of two chutes is fed into an independent side dumping car on the same industrial track as the sand and cement cars.

The cement and sand are received, proportioned, and dumped into the mixer and then follows the stone from its car. Thus there are two operations for each batch. The mixed concrete is finally raised in the tower by a double drum hoist and deposited into the carts that deliver it to the point under construction. The concrete is proportioned generally 1:2:5.

The closeness of quarters is appreciated when it is noted that the extreme width of the mixing plant is 18' and the length over all only 54'. It is such a careful planning as this that brings economical results.



Reinforced concrete house of Architect B. A. Mueller, St. Louis, Illinois.

Use of Corrugated Iron Floor Forms.

One of the recent departures in concrete construction which gives promise of considerable future development is the use of corrugated iron sheets for the centering of concrete flooring. In discussing this feature of concrete work recently, Leonard C. Wason, of the Aberthaw Construction Co., gave some interesting details.

Corrugated iron has been used extensively for this purpose in Minneapolis and more recently in the vicinity of Boston, notably in the construction of the new concrete warehouse of the Massachusetts Cotton Mills at Lowell, Mass. No. 20 gauge black corrugated iron is the material employed. For flat floor construction particularly, where the design calls for the mushroom

type of construction, corrugated iron has proven most satisfactory, especially in the matter of cost.

In the erection of the Massachusetts Cotton Mills warehouse the following was adopted: The junctions of column heads with floor were arranged with a square metal plate fastened to column head. The inside was the outline of the column, sometimes octagonal and sometimes circular, but the outer edge was a square. The corrugated plates lapped onto the square, and by sliding them in or out longitudinally the right amount of lap and close the area of floor was obtained. Then by lapping over one or more corrugations crosswise you get the correct fit the other way, so there is practically no cutting to do. They were supported on plank on edge 24" apart and did not sag when loaded.

Of course, if the appearance of the ceiling is objectionable this type of form could not be used; but in a storage warehouse the looks were of no particular consequence. Although there were some laps, which made a rather blunt edge, its appearance was no worse than is frequently obtained from bad joints with boards.

As far as economy goes, the cost is about one-half that of wooden floor forms; and it therefore, from that standpoint, was a great success. When drawing the false work nearly all the props were taken out, leaving just barely enough to keep the forms up; ropes were then put around these, the men keeping at a distance where there was no danger of getting hurt, and the remaining posts were then jerked all out at once, dropping the forms of a large room at a single operation. The corrugated iron came down pretty straight and did not get bent up much, but what little damage there was was taken care of by two men with a hand straightener.



Form work for reinforced concrete bridge over Eel River, Humboldt County, Cal. Length, 1454 feet; roadway, 42 feet high; width, 24 feet; to cost \$250,000.

CONCRETE'S Booth at the New York Cement Show in Madison Square Garden will be 138. Come and see us.

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In requesting change of address, please give former address

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Vol. XII DETROIT, JANUARY, 1912 No. 1

ROSTER OF CONCRETE ORGANIZATIONS, OFFICIALS AND CONVENTIONS.

National Association of Cement Users, Harrison Bldg., Philadelphia, Pa.

Cement Products Exhibition Co., 72 West Adams St., Chicago, Ill.; Secretary-Treasurer, J. U. C. McDaniel, 108 La Salle St., Chicago, Ill.

Eastern Cement Show, Madison Square Garden, New York City, January 29-February 3, 1912.

Western Cement Show, Coliseum, Chicago, Ill., February 21-28, 1912.

Kansas City Show, Convention Hall, Kansas City, Mo., March 14-21, 1912.

Northwestern Cement Products Association, J. C. Van Doorn, Secretary, Security Bank Building, Minneapolis, Minn.

Iowa Association of Cement Users; Secretary, Ira A. Williams, Ames, Ia. Convention and Show, Sioux City, Ia., Jan. 10-12, 1912.

Nebraska Cement Users' Association, Columbus, Neb.; Secretary-Treasurer, Peter Palmer, Oakland, Neb.. Mid-West Cement Exposition, Omaha, Feb. 6-9, 1912.

Oklahoma Cement Users' and Contractors' Association; Secretary, D. C. Patterson, 336 Bassett Bldg., Oklahoma City, Okla.

Concrete Machinery Manufacturers' Association; Secretary, Le Roy A. Kling, Cedar Rapids, Ia.

Canadian Cement and Concrete Association; Secretary, William Snaith, 57 East Adelaide St., Toronto, Ont.

CEMENT EXHIBITIONS SHOW THE WAY FOR BETTER WORK.

We believe in the Cement Shows for two main reasons: First, because they educate within the ranks of those identified with concrete construction, either as architects, builders, engineers or manufacturers; and second, because they educate the general public. It is important that those within the industry shall be educated in every new method and device pertaining to that industry and making in some way or other for better results, because in this perfection of the industry the public is having established for its consideration more definite proof of the value of concrete construction in its myriad applications.

The two possibilities for education which the Cement Shows embody are thus complementary. They show the artist and the artisan what may be done and they prepare the public mind for what is to be done and create a demand for what those in the industry are taught to execute.

We believe in the Cement Shows on certain general principles which are dear to mankind. It is not for nothing that men were created with gregarious instincts for in the commingling of the ideas belonging to any industry something better, something more beautiful, something more efficient is inevitably evolved.

We believe in the Cement Shows because they are a result of a commendable spirit of exposition, a spirit which shows to all who come what has been done—a spirit of enthusiasm, a spirit which would impart itself to the whole of mankind. *We like our work; let's talk about it.*

"We are not sent into the world to do anything into which we cannot put our hearts. We have certain work to do for our bread, and that is to be done strenuously; other work to be done for our delight and that is to be done heartily; neither is to be done by halves or shifts, but with a will; and what is not worth this effort is not to be done at all."

So said John Ruskin. Some of the Cement Show spirit will make the work which is done for bread a part of that work which we do for our delight. The Cement Shows make for better work in every nook and corner of the industry, and when we are able to do better work and are conscious of it we certainly have a lot of delight in it. We shall absorb some of that spirit of better work and some knowledge with which to make it possible at New York, January 29 to February 3; Chicago, February 21 to 28, and Kansas City, March 14 to 21. Then, also, there are Sioux City, January 10-12, and Omaha, February 6 to 9.

It is a duty which a man owes to his capabilities for better work that he attend as many of these exhibitions as possible.

POSTAL DEFICIT IS NOW REPLACED BY COMFORTABLE SURPLUS.

What's this? What's this? Postmaster-General Hitchcock reports a surplus in the Postoffice Department? Must be some mistake here. Yet the report is official and is to be supported by a large volume of departmental statistics. How this can be, when the newspapers and magazines have been going through the mails in increasing quantities for the past twelve months, is puzzling to everyone but the publishers. We have contended from the first that our old friend, the deficit in the department, was not, and could not, be chargeable to the mail matter of the second class. Mr. Hitchcock has viewed the situation with alarm, even to the extent of consenting to the appointment of a commission to consider ways and means of cutting down expenses in the department, and increasing revenues by elevating the rate on magazines and newspapers, making goats of the advertising and sheep of the reading matter. The commission has sat. Now it appears to have been sitting on an egg that needed no hatching.

If the system and the prices under which the government has been carrying mail matter of all classes results in a surplus, it looks as if no "reform" were necessary. The government is, of course, not in business to make money by carrying the mails. If the department breaks even, it is doing all that its heads ought to expect. Wonders will never cease. We have a surplus in the Postoffice Department, and without raising the price of reading matter to the American people. Congratulations are due the readers of the country, and to Postmaster-General Hitchcock and his manage-

INTELLIGENT SUPERVISION WOULD HAVE PREVENTED LOSS OF LIFE.

December 6, 1911, a three-story reinforced concrete building being erected for the Prest-O-Lite Co., in Indianapolis, collapsed and carried down forty men in the ruins. Eight of these men were killed and 21 others more or less seriously injured.

Immediately a new hue and cry was raised against reinforced concrete construction.

In fevered agitation which follows so lamentable a tragedy, criticisms almost inevitably are sweeping and ill-advised. We do not know what was wrong in the case of the Prest-O-Lite company building; the facts of the case have not been made known. Yet certainly one of three things was wrong—or perhaps two of the three, or all. The design may have been wrong; the concrete mixture may have been wrong; the provisions for proper curing of the concrete may have been inadequate.

The principals of reinforced concrete construction are well established and if anything was wrong in this connection it is more than likely that the error crept in, in the execution of the design by incompetent workmen.

Intelligent supervision is important in concrete work to make sure that workmen, either through

ignorance or cupidity, do not skimp. Unscrupulous contractors or ignorant contractors skimp not only in the materials used in the mixture but in the operation of mixing. That most contractors are honest and intelligent in concrete work there is evidence in the thousands of excellent reinforced concrete buildings now in use. It is the exception to the rule which the public learns most about. It is against this exception that the public must guard.

Concrete is the only building material which is not at its best when it is first put in place. A building made of good concrete is a better building next year than this. The hardening process goes steadily on, under ordinary advantageous conditions for many months. One disadvantageous condition is cold. Concrete work in cold weather has to be done with special provisions to insure proper curing. Yet even these precautions are pretty generally understood and there is no excuse for not taking them. It is a disadvantage perhaps in concrete construction that a reinforced concrete floor slab, for instance, must not be subjected to undue stress before it has had time in which to attain strength. It is a great advantage of concrete, however, that if cupidity or ignorance do enter in and failure ensues the failure is almost sure to come before completion when the lives of the general public might be jeopardized. The fault—though not the nature of it, necessarily—is revealed promptly and it is the workmen who suffer, as in Indianapolis.

The failure of the building in Indianapolis gives no occasion for any criticism of concrete as a structural material, no matter what the cause of the failure. But it emphasizes the need for supervision—intelligent supervision. The greatest structural advantages are possible in an intelligent combination of the great tensile strength of steel and the prodigious compressive strength of concrete.

Ordinary factors of safety and the fact that concrete under just fair conditions is stronger than is figured to be necessary give broad limits within which life and property are protected—once the structure is completed and the concrete has attained its full strength. But in the form work and in the curing before the concrete has attained its strength carelessness and incompetency constantly imperil the lives of the workmen who are not responsible for the loose methods. Honesty is a matter of policy—honesty and intelligence at each step of the way.

Good Portland cement, clean, hard aggregates, properly proportioned and mixed with adequate water, confined in rigid formwork and carefully guarded against shock or undue stress until crystallization gives strength—all these are necessary and one thing is quite as essential as another. Intelligent supervision makes them possible.

Indianapolis should have a good building code to govern concrete construction and all other construction and it should see to it that the provisions of the code are enforced.

WHAT IS THE BEST DEVICE IN YOUR FACTORY AS A LABOR SAVER?

Under the above caption in the December, 1911, issue of CONCRETE we asked for brief descriptions of labor saving devices in concrete products plants. It makes no difference whether a device is a piece of patented machinery, a home-made contrivance or merely a handy arrangement and layout of various pieces of equipment. Make a little sketch—if a sketch is necessary to convey the idea—and write a brief description. For the best "labor saving suggestion" in concrete products manufacture CONCRETE will pay \$10. This may not pay you for the idea but will compensate you perhaps for the few minutes which you devote to the description. The author of every other suggestion which is published will receive a year's subscription to CONCRETE, a renewal or extension—either for himself or someone else whom he knows to be interested. These suggestions must be received before February 1.

CAREFUL CURING IS IMPORTANT IN LAYING CONCRETE PAVEMENTS.

Proper curing is quite as important in building roads of concrete as in other concrete construction, and yet this important feature of the work is not given the attention which it should have in many cases.

The specifications followed by the Board of County Road Commissioners, Wayne County, Mich., demand that after the concrete has been laid and until it has thoroughly set it shall be protected from the sun by a canvas covering, and that when, in the judgment of the engineer, the concrete is sufficiently hard to warrant, this covering shall be removed and the concrete covered with a layer of sand or gravel 1" in depth and be sprinkled several times daily so as to be kept damp



Bridge Used by Workmen Finishing Concrete

continuously (for eight days) to prevent the surface of the concrete from drying out while setting.

An accompanying illustration shows the canvas covering on that portion of the road immediately behind the concrete mixing machinery.

In this same successful road building in Wayne county, Michigan, unusual precautions are taken to

leave the concrete undisturbed, once it is put in place. The rule is imperative that workmen keep off the concrete. The finishers use a bridge like that shown in an accompanying illustration. This bridge is iron shod and rides on the angle iron which covers the top of the side rails.

As to the care in seeing that the concrete is properly cured it is interesting to discover just how few are the cracked sections of pavement. In 30 miles of concrete pavement there are about 6,300 25' sections. There



Concrete Covered with Canvas

are less than 100 cracked sections. Practically all of these cracks are small and rather unimportant—there being no bad breaks. More than three-fifths of the cracks are in the first three and a half miles of pavement, in laying which methods were not quite so good as now, owing to lack of experience. This leaves less than 40 cracks in about 5,600 sections of the later pavement or about 7/10 of one per cent of cracked sections.

Go to booth 138 at Madison Square Garden, New York City, January 29-February 3. CONCRETE will be there. The booth number at the Chicago show will be 32 and at Kansas City 3. Remember the numbers.

A SURVEY OF THE CONCRETE AGGREGATES OF WISCONSIN.*

BY M. O. WITHEY.†

It is the purpose of this paper to describe the methods employed at this University in testing the sands, broken stones and gravels of Wisconsin in order to ascertain their respective merits as aggregates for making mortar and concrete.

Concrete may be defined as a mixture of inert particles of sand and gravel, sand and broken stone, or similar substances (called aggregates) and a binder which, mixed with water, possesses the property of hardening and cementing together the inert materials into a stonelike, monolithic mass. Mortar is a like substance made from a smaller aggregate, such as sand or broken stone screenings, and a cement. At the present time Portland cement is the material most used for a binder in concrete. It is obvious that the cement should be of good quality if a strong and durable concrete is to be made. Consequently, engineers have adopted certain specifications which the cement must pass before it will be accepted for use. Many engineers have long appre-

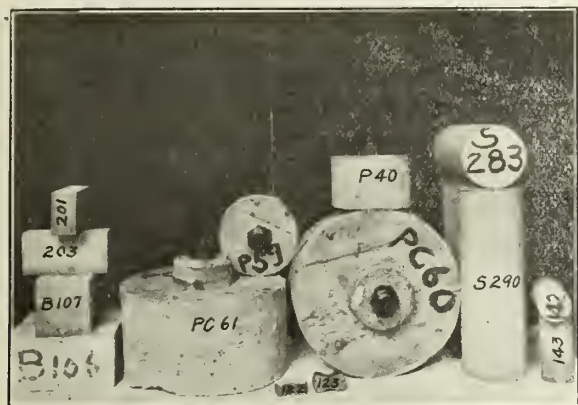


Fig. 1. Specimens Used in Different Tests

ciated the necessity for specifications concerning the general character of the sand, gravel and broken stone, but rigid tests of these aggregates have seldom been specified. The conviction, based upon credible experimental data, is now quite firmly fixed that certain classes of aggregates should not be employed to make concrete. The causes of many failures at first attributed to poor cement have later been traced to the use of a sand or aggregate wholly unfit for such a purpose. Inasmuch as the determination of the suitability of various aggregates is oftentimes a long and somewhat costly process and requires a large equipment of apparatus, it is only

within the province of the larger laboratories to attempt such tests.

During the past seven years the United States Geological Survey has been conducting some very elaborate tests on materials found in different parts of this country and has issued bulletins containing accounts of its methods of testing and some of the results obtained. Two years ago the Mechanics Department of this University started on a program of tests which will be followed in analyzing the aggregates found near the larger cities of this state.

The method of carrying out the program follows. Arrangements for securing material are made by a member of the laboratory force who, in general, inspects the deposit and determines the amount of the various aggregates needed for the tests. In order to make all the tests outlined in the present schedule, about 3000 pounds of sand and 4000 pounds of broken stone, or the equivalent in other aggregates, are freighted into Madison in cement sacks. The effort is always made to secure a sample which will represent the average out-put of each pit or quarry.

If a complete sample of material is obtained, it is subjected to the series of tests outlined below. These tests are made by paid assistants who have shown themselves accurate and painstaking and who follow carefully prepared instructions concerning the methods of handling the details of the different tests. Hitherto most of the work has been done during summer vacation, but with a recently obtained increase in the department force it is now possible to carry on the work continuously, and to much better advantage.

OUTLINE OF TESTS FOR STUDYING THE MATERIALS OF WISCONSIN WHICH ARE SUITABLE FOR MAKING CONCRETE OR MORTAR.

I. (a) Physical Tests on Aggregates.

1. Weight per cubic foot, measured loose.
2. Percentage of voids.
3. Specific gravity.
4. Granulometric (sieve) analysis.
5. Percentage and character of silt.
6. Percentage of moisture.
7. Character of aggregate.

(b) Chemical Tests (when necessary).

II. Physical Tests on Mortars Made with a Standard Mixture of Portland Cements and Sand, Screenings, or Other Material Smaller than One-Quarter Inch in Diameter.

1. Tensile tests on standard briquettes (Fig. 1, Nos. 122 and 123). Mixes employed are 1:2, 1:3, 1:4, and 1:5. Four briquettes of each mix are tested at the following ages: 1:2 mix at 7, 28, 60, 180, and 360 days; 1:3 mix at 7, 28, 60, 180, 360 days, 2 yr., and 5 yr.; 1:4 and 1:5 mixes at 7, 60, and 360 days.
2. Compression tests on 3x6 in. cylinders (Fig. 1, Nos. 142 and 143). Mixes employed are 1:2, 1:3, 1:4, and 1:5. Three cylinders of 1:2 and 1:3 mixes are tested at 7, 28, 60, 180, and 360 days; three cylinders of 1:4 and 1:5 mixes at 7, 60, and 360 days.
3. Yield tests—two trials on each mix used in 1.
4. Absorption tests on 2, 2¼x4x8-in. specimens (Fig. 1, Nos. 201 and 203) from each of the mixes.
5. Freezing tests on specimens similar to those in 4.
6. Fire tests on specimens similar to those in 4.
7. Permeability tests on four cylinders 8 in. in diameter and 5 in. high (Fig. 1, P 40 and P

*This paper, which with the illustrations is reprinted through the courtesy of *The Wisconsin Engineer*, though telling of methods employed in testing concrete aggregates in Wisconsin, is of general interest, because the tests are applicable anywhere, and for the general reader the paper serves properly to emphasize the importance of the utmost discrimination in the selection of the materials which go to make concrete.—Editor.

†Assistant Professor of Mechanics, University of Wisconsin.

59; and Fig. 5) from each of the above mixes. The shortest path for water flow is 2 in.

Tests Nos. 4, 5, and 6 are made at 60 days; No. 7 at 28 days.

III. Physical Tests on Concrete Made with a Standard Mixture of Portland Cements and Both Fine and Coarse Aggregates.

1. Compressive strength of 6x18-in. cylinders (Fig. 1, S283 and S290). Mixes employed are 1:2:4 and 1:3:6 proportions by volume; 1:6 and 1:9, proportions by weight. The last two proportions are determined by a combination of the mechanical analysis and yield test methods. Tests will be made whenever possible by using materials from the same locality. In studying some of the broken stone aggregates, tests will also be made using Janesville sand for the fine material. Three specimens of each of the first two mixes are broken at 7, 28, 60, and 360 days. A like number from the other mixes are broken at 7 and 60 days.
2. Yield of concrete from each of the mixes in 1.
3. Absorption tests on 2, 5x5x10-in. specimens (Fig. 1, B106 and B107), same mixes as in 1.
4. Freezing tests on specimens similar to those in 3.
5. Fire tests on specimens similar to those in 3.
6. Permeability tests on 4 cylinders 16 in. in diameter and 9 in. high (Fig. 1, PC 60 and PC 61) from 1:2:4, 1:6, and 1:9 mixes. Specimens are similar to mortar permeability cylinders except that the distance from embedded opening in casting to surface of concrete, shortest path for water flow, is 6 in. in concrete specimens.

Tests Nos. 3, 4, and 5 are made at 60 days; No. 6 at 28 days.

Lack of space prohibits a detailed explanation of the methods employed in making these tests and only the general method of making the more important ones will here be considered. The general purpose of making physical tests is to ascertain what relations exist between these various physical properties and the physical properties of mortars and concretes made from the material under consideration. Some of these tests can be easily and quickly made, and afford valuable indications of certain properties which the corresponding mortar or concrete will possess. For instance, the weight per cubic foot, measured loose, is of importance in determining the percentage of voids, or space not occupied by solid aggregate. A knowledge of the percentage of voids is an aid in judging how much cement or mortar is required to fill up these spaces and produce a dense mixture. The weight per cubic foot is found by means of the apparatus shown in Fig. 2A. Sun-dried material is allowed to fall through the trap door, *d*, of the hopper, *h*, at such a rate that the cubic foot measure, *m*, is filled in one minute. The measure is then struck off even full with a straight edge and the material weighed.

The percentage of voids is found by pouring, very slowly, about three-fourths of a cubic foot of sun-dried material into the voidmeter, Fig. 2B, which contains about one-half cubic foot of water. Before and after the material enters the voidmeter, the height of the water column in the glass tube, *t*, is read on the scale, *s*, to .001 cu. ft. By correcting for the contained moisture in the sun-dried material, and the absorption

after entrance into voidmeter, both percentage of voids and specific gravity can be computed.

Granulometric Analysis.

The granulometric, or sieve, analysis is made by screening a representative sample of sand, gravel or broken stone over sieves of different mesh and determining the weight of material caught upon each sieve. By plotting a curve with percentage of sample (by weight) less than a given size of mesh as ordinates, and diameter of mesh as abscissae, the gradation of the material can be observed. Such curves may be seen in Fig. 3.

From elaborate experiments by Feret, Fuller, Thompson, and others, laws have been deduced from these mechanical analysis curves which are of considerable importance in estimating the value of aggregates. Consider curve I, Fig. 3; this represents a very

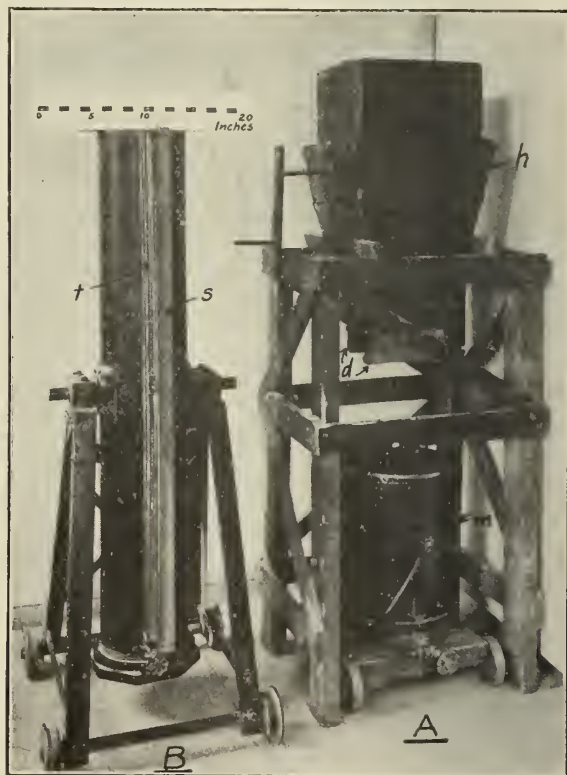


Fig. 2. A—Weight per Cubic Foot Apparatus. B—Voidmeter

fine sand which will make a mortar easy to work with a trowel, but which will be neither strong nor impermeable. The sand corresponding to curve II is well-graded and will make a very strong, dense, and impermeable mortar; but the mortar will not be so easily worked as that made from sand I. A very coarse sand is represented in curve III; this will make a strong, rough surfaced mortar which will be very difficult to work with a trowel. In still another way, have these gradation curves been employed. Experiments by Fuller and Thompson indicate that the densest, strongest, and most impermeable concrete is obtained if the gradation of all particles, including the cement, conforms to a definite curve formed by an ellipse and straight line tangent. Their curve for a mixture of gravel, sand, and cement in which the

diameter of the largest particle is less than one inch, is shown in curve IV. Similar curves to No. IV are used in this survey in determining the 1:6 and 1:9 proportions for concrete.

Next consider the test to determine the percentage of silt. Silt is the name given to the very finely subdivided material of earthy or organic origin which is often present in aggregates, especially in sands and

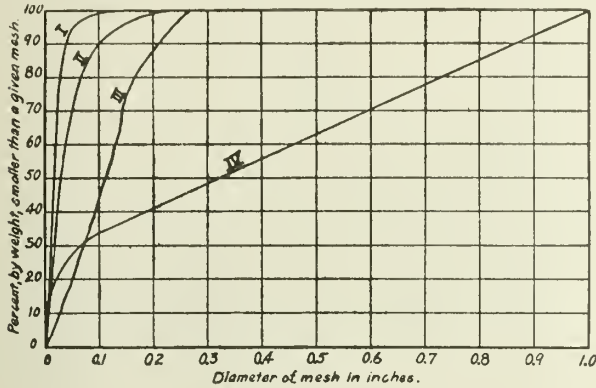


Fig. 3. Mechanical Analysis Curves

gravels. It has been found that certain kinds of impurities such as mica, loam, organic matter, or clay

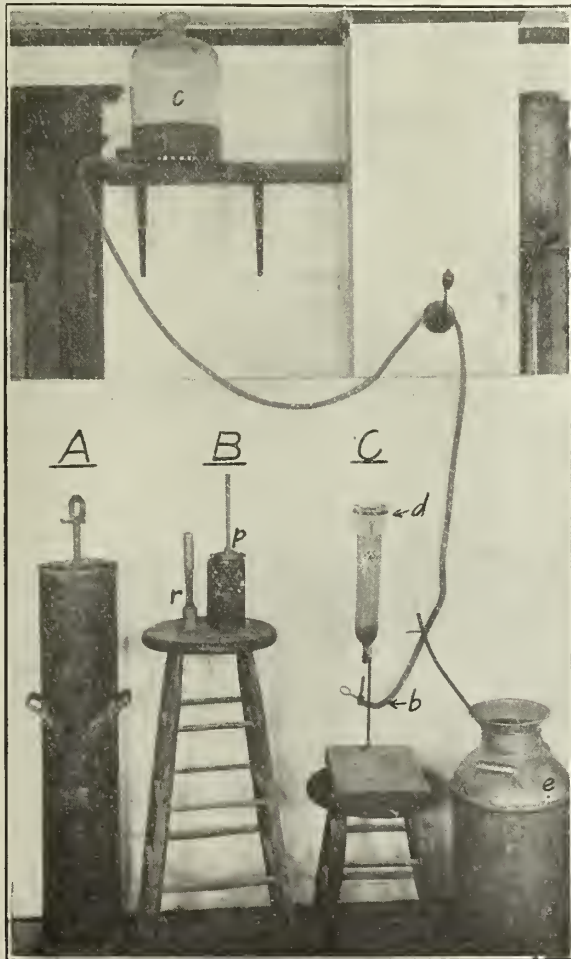


Fig. 4. A—Yield Test Apparatus for Concrete. B—Yield Test Apparatus for Mortar. C—Apparatus for Determining Silt

are undesirable elements in aggregates. Consequently, since these impurities are frequently in the silt, it is important to determine the amount and character of

this finely subdivided material in order to estimate the value of an aggregate. In making the test, a 200 gram sample of the material is carefully weighed and placed in the percolator, *a*, shown in Fig. 4 C. A piece of No. 200 wire cloth placed over the opening in the stopper prevents the fine material from descending into the pipe, *b*. Clean water is admitted from the aspirator bottle, *c*, and flows away from the percolator carrying the silt through the syphon, *d*, into the large can, *e*. At one minute intervals the material is thoroughly stirred. The process is discontinued when the water clears immediately after stirring, thereby showing an absence of silt in the percolator. The solution in can, *e*, is evaporated in a large evaporating dish and the residue scraped out, weighed, and preserved for chemical analysis. The percentage of silt and its character can then be determined.

Mix Brands of Cement.

Thus these facts, in conjunction with other physical properties, such as percentage of moisture, percentage of absorption, chemical composition, the shape of particles, appearance of surfaces, and the strength of broken stone or gravel, furnish valuable indications of the properties of mortars and concretes made from a given material.

In order that a minimum variation in the cement might obtain, it seemed advisable to mix different brands to form a standard Portland cement. It is hoped that, in this way, the variations in quality of the individual brands purchased from time to time will be neutralized in the mixture; and that a cement will thus be secured which will have more uniform properties than could be obtained by purchasing any one brand. The different brands are purchased in the open market and subjected to the standard tests of the A. S. C. E., and in addition, strength and soundness tests are carried on for a period of one year. After the 28 day strength tests have been made, the different brands are thoroughly mixed and stored in large galvanized iron tanks, the covers of which are hermetically sealed with modeling clay. Samples of this mixture are subjected to the same tests as the individual brands. About 20 pounds of each brand or mixture is preserved in fruit jars for future tests, or for any check tests which it may seem desirable to run.

The aggregates are arbitrarily divided into two classes, fine and coarse, by screening on a $\frac{1}{4}$ -inch sieve. The fine aggregates are subjected to series of tests No. II; the fine and coarse aggregates to series of tests No. III.

All mortar specimens are mixed by hand. The briquettes are hand molded in accordance with the A. S. C. E. standard specifications. The small cylinders and brick shaped specimens are mixed by hoe in a small metal mixing pan. A quantity of dry cement and sand sufficient to make a complete set of specimens is mixed for about four minutes until the mass appears uniform in color. A sufficient amount of water is then added to form a medium wet consistency, and the material is mixed for four minutes longer. The molds are then filled in layers to two inches deep, and tamped with the cast iron tamper shown in Fig. 4 B.

Wooden molds are used for all brick shaped specimens and cast iron or steel molds for the cylinders. Specimens are kept in molds for two days; then they are cured in water. Brick specimens are removed from the water bath at 14 days and allowed to cure in the air of the laboratory until tested. Mortar cylinders are also cured in water. Those untested at 28 days are removed and allowed to stay in air in the labora-

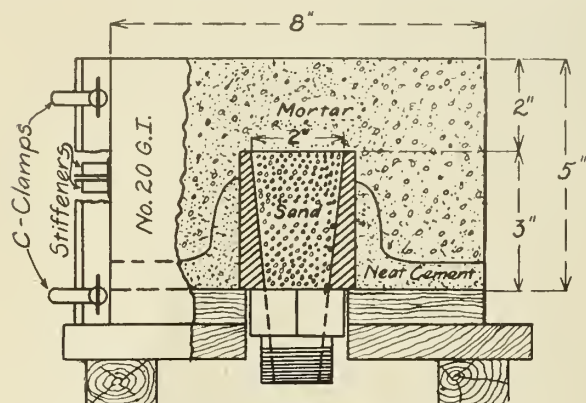


Fig. 5. Method of Casting Permeability Specimens

tory until 60 days old. The cylinders remaining after the 60-day tests are placed out of doors in a wire cage. The mortar for the permeability specimens is mixed in the same way as that used in making brick specimens or cylinders. The specimens are molded with the end which is the bottom during the test (Fig. 7) uppermost. Neat cement mortar is placed in the bottom of the mold and around the casting, as shown in Fig. 5, to prevent water leaking through along the sides of the casting. Then mortar of wet consistency is put into the molds and tamped. The castings are filled with wet sand to keep the mortar from entering them. On the following day, the surfaces of specimens uppermost in the molds are cleaned with a stiff wire brush to remove the thin layer of nearly impervious matter, called laitance, which appears on the top surface during the process of setting. After six days in the molds, the specimens are removed and sprinkled twice a day until two days before testing. The sand is then washed out from the insides of the castings, and the mortar surfaces within the castings are chipped off with a chisel to remove any mortar richer than that in the specimens proper which might segregate there during the molding process. The insides of the castings are thoroughly cleaned with a hose and filled with fresh coarse sand to act as a filter. The specimens are then immersed in a water bath until tested.

Machine Mixed Concrete.

Concrete specimens for the compression and permeability tests are made from machine mixed concrete. The required quantities of the different materials are placed in turn in a hopper car and weighed on a triple-beam scale. All materials are mixed dry in a No. 0 Smith mixer for $\frac{3}{4}$ min., and wet for $2\frac{1}{4}$ min. A wet mix is employed for all specimens. The entire contents of the mixer are then emptied into wheelbarrows. Next each mold is filled one-third full from the first wheelbarrow, two-thirds full from the second wheel-

barrow, and is completely filled from the last wheelbarrow. During the process of filling the molds, the concrete is puddled with a rod to get rid of the confined air and to prevent pocketing of the aggregate. The cylinders are allowed to stand about four hours with an excess of material on top; the tops are then floated smooth and level with a mason's trowel. After two days in the molds the cylinders are weighed and measured. They are then sprinkled twice a day for two weeks, after which those not registered for the early time tests are cured in the air of the laboratory until 60 days old. After the 60-day tests the remaining cylinders are placed in the cage out of doors.

The concrete permeability specimens are molded, cured, and tested like the mortar permeability specimens. For the fire, freezing and absorption tests on concrete, specimens resembling small blocks are molded from the hand mixed concrete used in the yield tests. The dimensions of these specimens are made 5x5x10 in., so that they are comparable to small blocks sometimes employed in construction. They are removed from the molds after one day and then cured and tested like the mortar brick specimens.

Fig. 6 B shows a briquette being subjected to a tensile test in a Riehle-automatic-shot-briquette-testing-machine. In starting the test, sufficient fine shot is placed in the bucket, *b*, to counterbalance the weight, *w*. After the briquette is adjusted in the grips or clamps, *g*, the trigger, *t*, at the top of the bucket is released; this opens a piston valve which allows shot to flow down into the cup, *c*. As the shot flows from the bucket the weight, *w*, moves downward; and, through the lever system, a strain is produced upon the briquette which is proportional to the shot lost. To keep the beam in the central position, the crank, *k*, is turned in the clockwise direction. When the briquette breaks, the bucket moves upward but the piston is held by the rod, *r*, so that the valve is immediately closed and the flow of shot stopped. The spring balance is graduated to read the load on the briquette to the nearest five pounds.

At A, Fig. 6, is shown a concrete compression cylinder with its lower end resting on a block having a spherical seat. The purpose of this block is to provide against an eccentric load, due to non-parallelism of the ends of the cylinder, by permitting adjustment between the upper head of the testing machine and the top surface of the cylinder. Blotting paper is placed at the top and at the bottom of the cylinder to fill up slight inequalities in the surface and to equalize the pressure over the cross-section. The upper head of the testing machine is lowered at the rate of .015 in. per min., thus producing a strain on the specimen which finally causes rupture.

The method of supporting and loading the brick and block specimens which are tested transversely is shown at C, Fig. 6. The supporting knife edges, *s*, are provided with spherical seats to eliminate as far as possible any tendency to twist the specimen, or any end restraint tending to prevent the lower side of the beam from lengthening. The apparatus is placed in a testing machine and the specimen loaded through the

upper knife edge, *e*. The load is applied very slowly by hand until the specimen fails. The breaking load and appearance of fractured section are noted.

The apparatus used in making the permeability tests and the method of attaching specimens is shown in Fig. 7. After the specimens have been coupled onto the outside $\frac{3}{4}$ -inch pipes, by unions, *u*, fitted with rubber gaskets, the pipes and glass tubes, *t*, are filled near-

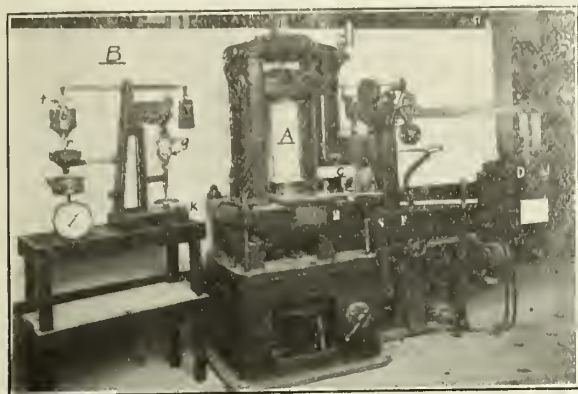


Fig. 6. A—Concrete Compression Cylinder Ready to Be Tested. B—Briquette Ready to Be Tested. C—Method of Loading Brick Specimen

ly full of water. An air pressure of 40 lb. per sq. in. is then admitted from the tanks, *r*, and readings of the heights of the water columns in the glass tubes are taken on the scales, *s*. Observations of pressure on the gauge, *g*, of the heights of the water columns, of the time, and concerning the behavior of the specimens are taken twice a day for three days; then the pressure is reduced to 10 lb. per sq. in. and readings taken for four days when the test is discontinued. After the test, the specimens are broken open and their appearance carefully noted. The tubes are all calibrated so that the quantity of water entering the specimens can be readily determined.

To Determine Volume of Concrete.

The yield test is used primarily to determine the volume of concrete or mortar which will be obtained if a given proportion of cement to aggregate is used. It is also possible to determine the density of the mix, and the relation between maximum density and ratio of volume and cement or mortar to voids in aggregate. Since the strength and impermeability vary with the density, this test is of importance. The yield test on a mortar is made by mixing a sufficient quantity of mortar of medium wet consistency nearly to fill the small cylinder shown at B, Fig. 4. The material is tamped into the cylinder in four layers by a rammer, *r*. The piston, *p*, with rod graduated to read to .0001 of a cu. ft. is lowered into the cylinder and whirled about to level the surface of the mortar. The spider, supported on the top of the cylinder, through which the piston rod slides, carries a mark from which readings are taken of the volume of the material in the cylinder. The weight of the materials before mixing, the weight of the cylinder, and the weight of the cylinder and mix are all taken. Consequently, if the weight per cu. ft. and the specific gravity of the different materials is known, the yield, or ratio of volume

of mortar to volume of aggregates, and the density, or ratio of absolute volumes of cement and aggregate to total volume of mortar, can be computed. The yield test on concretes is made in a similar way by making use of the large cylinder, Fig. 4 A.

Two of the bricks, or block specimens, from each mix are subjected to an absorption test. After drying to constant weight at a temperature above 250° F., the specimens are put into pans containing water two inches deep. They are surface dried and weighed at the end of 30 min., 4 hrs. and 48 hrs. From these data the percentage and rate of absorption can be determined.

The same specimens employed in the absorption test are used in the freezing test. If the bricks have dried out they are again soaked in water for four hours and then placed in a refrigerator in which the temperature is kept below +15° F. After twelve hours or more in the refrigerator they are removed and plunged immediately into a tank of water in which the temperature is maintained above 150° F. Then they are soaked in hot water for one hour and put back again into the refrigerator. This cycle of operations is carried out ten times. Following the last soaking in hot

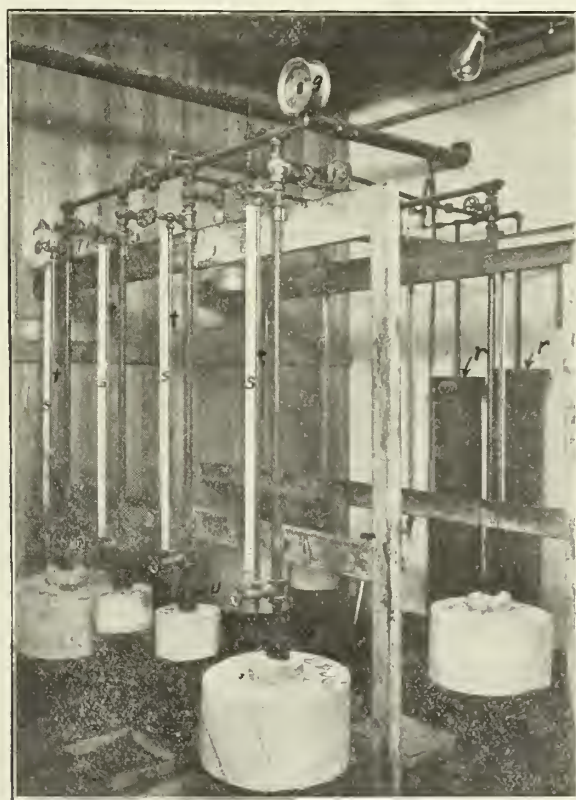


Fig. 7. Apparatus Used in Making Permeability Tests

water the specimens are weighed, allowed to dry out, and are then tested in cross-bending.

Two of the bricks, or block specimens, from each mix are subjected to a fire test. The specimens are placed in a cold gas-furnace, gradually heated to 1700° F., and then kept at this temperature for at least 30 minutes. Temperatures are measured by four thermocouples placed in different parts of the furnace. Upon removal from the furnace, one specimen of each kind

is immediately plunged into cold water and the other allowed to cool in the open air. Both are subsequently tested in cross-bending, and the results noted. The remainder of the brick and block specimens are tested in cross-bending. Thus a relation between the normal strength and the strength of the brick after being subjected to the freezing or fire test is obtained.

Careful records are kept of all data taken, or connected with any of the tests, on blanks specially prepared for the purpose. To insure that the tests or changes in curing conditions will be made at the proper time, cards are made out as soon as the specimens are made and filed in chronological order. An assistant makes it his first duty each day to look at this card index and follow the instructions given therein. The results of the tests are filed in an index and the major portion of the data is computed as soon as it is determined, in order that errors in method of making the tests or discrepancies in results may be observed and corrected before other tests are made. Whenever an amount of data has been compiled sufficient to warrant publication, a bulletin will be issued.

It is hoped that two things may be accomplished by this survey of aggregates, first, that more complete knowledge of the properties of the larger sources supplying such material may be obtained and published, thus benefiting the people of the state directly; and second, that the results obtained may be of value in advancing general knowledge concerning the properties of mortar and concrete.

CONCRETE ATTRACTIVELY EMPLOYED IN BOSTON HOTEL CONSTRUCTION.

The Hotel Princeton in Boston, built from plans and specifications by John C. Spofford at a cost of \$250,000, shows the attractive use of cement stucco finish. It is three-coat work, the total thickness of

the stucco being one inch. The basement floors are of concrete construction, and so are the flooring in the dining room, the lobby and the corridors. The foundation is of concrete with a small tile overlay. The trimmings are of cast concrete sandstone from Emerson & Norris, Brighton, Boston. Gilbert Bros. were the building contractors. The window casements outside and the door arches are of cast sandstone, likewise the sills, doorsteps and basement window casings, and the copings.



Home of N. W. Wahlwend, Akron, Ohio; Hupster & Bliss, architects; frame construction with stucco on metal lath.

CONCRETE'S booth at the New York Cement Show, Madison Square Garden, January 29-February 3, will be 138. Come and see us.



Hotel Princeton, Boston



INFORMATION DEPARTMENT

Inquiries regarding sand and all other materials are cheerfully answered, like all other questions, but in cases of importance it is best to invest in a laboratory analysis. Write to us for particulars, address, Laboratory Department.

Preventing Efflorescence.

How am I to prevent efflorescence? I have been bothered by it on some concrete columns just built. K., Wisconsin.

This is a question often asked and the remedy is in a dense mix. Efflorescence, a white deposit on the surface of concrete, is the result of soluble portions of the aggregate working out to the air. The prevention of it lies in making the concrete dense by the use of carefully graded aggregates, plenty of water and thorough tamping. It may be removed by using a weak solution of hydrochloric (muriatic) acid, one part of acid to six or ten of water. The wash should be well rubbed into the pores of the concrete with a brush and should be rinsed off with clean water as soon as the efflorescence has disappeared.

* * *

Temperature in Curing Chamber.

How high may the temperature be in a steam curing chamber before the steam ruins the concrete tile? A., Ohio.

It is recommended that the temperature of the curing chambers be maintained between 70 degrees and 120 degrees Fahr. In case the steam is admitted through a trough of water so that the atmosphere is thoroughly saturated with moisture, a temperature higher than 120 degrees is allowable; in fact, with this method there is no danger of getting too high a temperature.

When the steam is not admitted through water into the curing chambers, 120 degrees Fahr. may be too high a temperature, depending upon the amount of moisture in the room.

* * *

Tank for Brine in Ice Plant.

I would like information on building a tank for brine in an ice plant. The tank is to be 24' 9" long, 10' wide and 4' deep and it is proposed to give it 8" walls. L., Kansas.

In building the brine tank the top of the wall may be 8" thick, but the bottom should be twice as thick for a depth of 4'. No reinforcement is needed, but it is advisable to run through the middle of each piece a layer of hog-tight fencing in order to take care of temperature changes and tie the sides, ends and bottom together, turning it around the edges and corners. Make the concrete as dense as possible with not too much water. It should be a mixture of 1 cement, 2 clean coarse sand and 3 parts of stone, no piece being more than one inch cube. Do the work carefully.

Concrete Tunnels for Steaming Planks.

I want to build tunnels about 20' long, 4' 6" wide and 6' high in which to steam plank $2\frac{3}{4}$ " thick and about 30' long. Will concrete be a good material for this purpose? These tunnels will be outside exposed to the weather. They will be heated by exhaust steam and there will be no pressure on them. The tunnels when built of wood soon rot out. Will Hy-Rib metal be all right for a form for the concrete? S., New York.

If the steam is not under pressure, the tunnels may be made of concrete just as you propose. The Hy-Rib metal will be a good material to use, for it makes a frame on which to spread the mortar and at the same time reinforces the walls.

There should be two shells to prevent temperature cracks. Make the walls of Hy-Rib plastered on both sides until it is 4" thick. Around this put more Hy-Rib far enough away to leave an air space of at least 3" and plaster on the outside until the outside wall is about 2" thick.

* * *

White Portland Cement.

Will you give me some information on white Portland cement? I would like to know what plants are now making this product in the United States and the production. Is there a demand for this product? What is the price per barrel? M., Ontario.

White Portland cement is made by the Atlas Portland Cement Co., 30 Broad street, New York City; Sandusky Portland Cement Co., Sandusky, O., with capacity for 400 barrels daily; the Berkshire White Portland Cement Co., 100 barrels daily, marketed through the Vulcanite Portland Cement Co., Flatiron Bldg., New York City; the Blanc Stainless Cement Co., Allentown, Pa., capacity 200 barrels daily.

The price of white Portland cement is from \$4 to \$6 per barrel. The demand for white cement is increasing and there undoubtedly will be a larger market for it as its use in connection with decorative concrete is growing larger.

* * *

Reinforcing Street Walks Over Ditches.

Shall I use woven wire fencing for reinforcing street walks over ditches, where the span is from 2' to 6'? How many layers should I use and how thick should the walk be, using 1:3:5 mix? B., Tennessee.

We would like to help you, but we need more information.

A 1:3:5 mix should never be used for reinforced concrete. A 1:2:4 mix is the leanest that should be used, for it is the cheapest on account of its greater strength and density. In the second place, you do not tell anything about the cross-sectional area of your wire fencing. In order to give an intelligent reply we must know the gauge of the wire used in making the fencing and the exact spacing of the wires. In giving the gauge of the wires, tell whether it is American, Birmingham, or Stubbs, or whatever

gauge is used, for there are a number of gauges and merely to tell the number of the gauge without giving the name is not enough. Also are these slabs to be strong enough to permit wagons to go over them or are they to be merely strong enough for pedestrians?

* * *

Coloring Concrete Walks.

We would like to know what coloring matter is used to produce a blue-gray shade in concrete walks? M., Rhode Island.

It is rather difficult to say exactly what is to be used in your concrete to produce a definite shade in the walk, for so much depends upon the other materials in the mix, and the best way for you to determine just what is needed to produce a certain color is to make a few small briquettes with the material which you intend to use, with different proportions of coloring matter.

Four pounds of lampblack to 100 pounds of cement in a mixture of 1:2 cement and sand, ordinarily will give a dark blue slate color. Two pounds of lampblack, ordinarily, will give a dark gray, and one pound will give a light gray.

We suggest, however, that you write to advertisers of coloring materials. They will be glad to give you information along the line in which you are interested, and they will be glad to tell you how to make the mixture.

* * *

Waterproofing a Basement.

Last fall we built under a part of our house a concrete cellar. After excavating there was a great deal of mud and water and therefore before laying any concrete the cellar bottom was covered with four or five inches of cinders well tamped down. On some days the floor is perfectly dry and on other days it is nearly covered with water. The floor was not laid all at one time, but in four sections, and it is where one day's work joins that of another day that the water comes in. The walls of the cellar are perfectly dry. What can be done? W., N. Y.

Since the water comes in at the joints in the cellar floor, the only thing to be suggested as a remedy is to calk the joints carefully with oakum and pour in tar or asphalt. If these joints are not wide enough for this then chisel them out to a width of nearly one-quarter of an inch. If this does not do the work, then have some skilled engineer make a personal examination. There may be something about the permanent water level in the ground, etc., that might complicate what looks like an apparently simple matter. On such problems it is difficult to give advice at long range. See the article published in this issue on waterproofing basements.

* * *

Insurance on Concrete Block Building.

Is it a fact that the insurance rate on a house built of concrete block is \$1.25 per hundred higher than on a house built of clay brick, other conditions being equal? We are about to lose two contracts for building concrete houses because the owners have the impression that they will have to pay a higher rate of insurance. M., Missouri.

The rates of insurance on concrete block houses should be no higher than the rates on houses of clay brick, other conditions being equal. If a charge of \$1.25 per \$100.00 higher than for clay brick is to be

made either there is an error on the part of the insurance companies or insufficient information as to materials has been supplied. The individual case may be affected by local conditions so seriously as to be the controlling feature in the case. Usually high rates of insurance are due to manifest errors of construction or badly located properties.

We suggest that you report this matter to W. H. Ham, 88 Pearl street, Boston, Mass. Mr. Ham is chairman of the Committee on Insurance of the National Association of Cement Users and we believe he will be very glad to have a committee investigation.

* * *

Gas Fumes in Concrete Chimney.

I would like to have you give me some information as to the non-effect of fumes of burning gas (natural or artificial) on a chimney built of concrete block. We are about to put on the market a block with an insulated inner wall for a flue liner. T., Ohio.

The products of combustion, such as the gaseous oxides of carbon, hydrogen and the various hydrocarbons, should not be sufficiently active, chemically, to cause any disintegration. The small amount of sulphur that might be present probably would be insufficiently oxidized to form any sulphur compounds of a serious nature. The constituent of concrete that is sensitive to reaction is the calcium hydroxide which in the presence of a high percentage of carbon dioxide in the fuel gases would soon be transformed to calcium carbonate which would be more or less immune to any condition outside of an acidic one. Undoubtedly there would be present in the chimney more or less free carbon, due to incomplete combustion of the gas. This would be deposited on the walls of the chimney and due to its very fine physical condition would enter into the pores of the concrete and undoubtedly form an even, continuous coating which would provide quite an efficient protective element, as carbon is a very inert material.

* * *

Making a Granulometric Analysis.

How is a granulometric analysis made? F., Tennessee.

A granulometric analysis is made by taking a sample of sand of known weight and drying it thoroughly in a laboratory furnace. It is then washed thoroughly and again weighed, the difference in weights being carefully noted. The sample is then passed through a nest of sieves running from eight meshes to the linear inch or 64 to the square inch down to 200 to the linear inch or 40,000 to the square inch. The amounts retained on each sieve are carefully weighed and their percentage of the whole computed. A parallelogram is drawn, the lower line of which represents the diameters of particles passing sieves of given mesh and the upright line being divided into percentages. On each upright line drawn above the diameter of a given sieve is indicated the percentage of materials passing that sieve. These points are connected by a line and the comparison of this line with the norm, the line that would be shown by a voidless sand gives at a glance knowledge of how

much material of given sizes must be added to or subtracted from the sample to make it approximate very closely a voidless sand.

If you have a sample which you wish analyzed in the foregoing manner, we shall be very glad to undertake the work for you at a charge of \$6.00. We should have a quart of the sand sent us carriage prepaid.

* * *

Waterproofing a Basement.

I have a basement here on the desert in southern Nevada, surface dimensions 50' x 80' and 7' 6" deep, that is giving me a great deal of trouble. Last winter, before I cemented the basement, the water stood 30" deep. It receded in the summer and I put down a five inch concrete floor, using 5 to 6 per cent of waterproofing compound. I also plastered the side walls to a height of 3'. For some time the basement was dry and then the water came in again and cracked the floor for a distance of 60'. The formation here is three to four feet of volcanic clay, or something called that, then lime rock and clay. There is not a drop of water on the surface of the ground and we have only four inches of rain in a year. I would like to know how to proceed to have the cellar dry. Do not refer me to a waterproofing company. T., Nevada.

From your account of the case we assume that the waterproofing compound is not at all to blame. It is evident that there is considerable pressure exerted against the bottom of the floor and evidently you did not provide strength enough to resist this pressure. The waterproofing compound, while increasing the impermeability of the concrete, does not give it strength to resist the strong upward pressure which made the floor crack.

Waterproofing in the desert should not differ materially from waterproofing anywhere else. Certainly the lifting pressure of water is the same in all cases. It appears that there is a lifting pressure in this case of about 200 pounds to the square foot, which must be taken into consideration and the ordinary methods of good engineering applied. This may be done by having sufficient concrete to provide a dead weight to hold the floor in place against the water pressure or by the use of reinforcing to take care of this lifting pressure. One practice is to arrange a system of beams in the floor, going under the columns and posts and under the side walls. These beams are reinforced as is the floor and the floor attached to the beams. It is like a floor placed upside down. We suggest that you read the article in this issue of CONCRETE on waterproofing basements.

* * *

Concrete Dam.

I want to put up an overflow weir or dam across a river which is about 20' wide on the bottom, showing a solid igneous rock formation, and rising on each side at about 45 degrees. The height may be 30' to 60' and the rise of the river during flood time is about 5', the water falling rapidly in the winter months and in the summer the stream is nearly dry. I want to build the dam of reinforced concrete and would like to know how to arrive at the calculations. It is proposed to put in about 205' of flume of reinforced concrete to afford power to turn a 20' diameter wheel 4' 4" wide. The flume is to be 4' 4" wide on the bottom and about 18" deep on the sides. The fall is at the rate of 3' per mile. C., South Africa.

We are sorry that we cannot take up specific cases in such large and important structures as a dam of the size you mention. That is an engineering

question of such importance that we advise you to employ a competent experienced engineer to give it his personal attention. In this department it is our endeavor to give helpful information. Your dam 30' high built in such a gorge as you mention will be fully 80' wide on top and will go into the rock banks on each side as well as into the bottom of the river to some considerable depth. The total height from the bottom of the foundation might easily be 50' or more and the total length on top more than 100'. We cannot undertake work of this kind in the Information Department.

The fundamental principles governing the design and construction of dams are to anchor the dam firmly to the foundation so it cannot slide. The horizontal shearing stresses must be carefully determined. The foundation must go deep enough into the ground to anchor the dam and also cut off water which might flow under it and in the end undermine it. Care must be taken to get enough weight on the dam so that if water does percolate underneath it will not have a tendency to lift the dam and thus ultimately destroy it.

From your description of the gorge it appears that a reinforced concrete dam should not be built there, a solid concrete dam with ogee face being the best to build. On the subject of reinforced concrete dams we refer you to Taylor & Thompson's treatise on "Concrete, Plain and Reinforced." (\$5.00.*)

* * *

Concrete Paving.

This is a town of 6,000 inhabitants. The question of paving some residence streets is before the people. We have about three miles of brick paving. It is two years old and cost approximately \$2 per yard, exclusive of curbing, gutters and excavation. We are urging the council to put in concrete, but the council is inclined to brick, as are the contractors. The people are nine to one for concrete. We want information. We have a good sand which can be had right on the job for 75 cents a yard. We have contended that a good concrete pavement can be put down for \$1.00 to \$1.25 a yard. What quantities of various materials are needed to make a cubic yard of concrete, say 1:3:5? Should gravel or crushed rock be used? In some towns where concrete pavements have been put down there are a few cracks running the way of the street almost in the center. I believe there should be expansion joints in the center. The pavements will be 28' to 30' wide. Do you recommend all one pour or a top dressing? H., Iowa.

We are very glad to do whatever we can to further the use of concrete paving. Concrete will have to fight its way to recognition as a superior paving material just as it has had to combat every step of the way for adoption for other structural purposes—by sheer force of merit.

The most important thing in laying a good pavement of concrete is in having a good specification to start with and strict supervision throughout the entire operation.

Concrete pavements have been successfully laid in many cities and in some cases have been down long enough to prove beyond a doubt that the material is a lasting one for the purpose.

Bellefontaine, Ohio, and Richmond, Indiana, were two of the first places in this country to lay concrete

*Book Department of CONCRETE.

pavements. The Bellefontaine pavement was put down more than seventeen years ago, and the Richmond pavement thirteen years ago. Both of these pavements are in excellent condition today. Concrete paving is by no means restricted to the small city. Thousands of yards are giving excellent service under heavy traffic in Chicago, Washington, Philadelphia and elsewhere.

The Bellefontaine pavement consists of a 4" Portland cement concrete base made of a 1:4 machine mix of cement and gravel, and a 2" wearing surface consisting of a 1:1 mixture of cement and screened black sand. The base concrete was mixed rather dry and well tamped and on this the top coat was laid immediately, or as fast as the second gang could follow the men laying the base. The concrete is made in strips 5' wide, parallel with the curb and extending the full length of the area paved. These strips afterwards were cut crosswise so that the pavement really consists of blocks 5' square. No other expansion joints were used. The top was given a smooth, sidewalk finish. The aggregates were carefully selected.

The pavement laid in Mason City, Iowa, which has given excellent satisfaction, consists of a foundation course 5" thick, composed of 1 part Portland cement, 2 parts of clean sand and 5 parts of $\frac{1}{2}$ " to $1\frac{1}{2}$ " screened stone. On top of this is a wearing surface 2" thick composed of 1 part cement, 2 parts clean, coarse, sharp sand. Expansion joints were made along the curb and transversely across the pavement every 25 feet. In between these 25 foot section a contraction joint was provided for $\frac{1}{8}$ " wide. The expansion joints were filled with asphaltic filler and the contraction joints were carefully finished off so that there would be no sharp edges to chip.

The Mason City paving cost \$1.25 per sq. yd., which includes 7" of excavation. Crushed rock, delivered, cost \$1.35 per cu. yd., sand \$.85 per cu. yd., cement \$1.20 per barrel, labor \$2.00 to \$2.50 per day.

Concrete roads laid by the Board of County Road Commissioners of Wayne county, Michigan (thirty miles of them laid within the last three or four years), are giving the very best of satisfaction, under severe traffic tests. These concrete roads have been laid on highways which are the extensions of the main thoroughfares of the city of Detroit. They are not laid in two courses—there is but one mix of concrete, top to bottom, and in most cases the concrete is 7" deep and 15' wide. It is composed of a mixture of 1 part Portland cement, $1\frac{1}{2}$ parts of screened, washed sand, and 3 parts of pebbles, these last named well graded from $\frac{1}{4}$ " to $1\frac{1}{2}$ ". A patent expansion joint is used made of soft steel. This consists of a plate 3-16" thick from which shear members are punched and these are pulled out, so that they project into the concrete at the end of each section, two plates being used between sections, and between plates two thicknesses of asphalt felt. These plates are first carefully formed to the curvature of the road.

The Board of County Road Commissioners has its own equipment and builds its own pavement. Some of the early pavements were laid on contract.

These roads have cost, complete, including drainage, culverts and gravel shoulders, from \$1.10 to \$1.80 per sq. yd., the cost depending to a very great extent upon the distance between the scene of operations and the base of supplies. The labor charge is rather high and it is necessary to board the men at some distance from the city, in construction camps, so you see that these conditions fully explain the variable cost figure. A rather detailed description of the road building methods of the Wayne County Road Commissioners was published in the October issue of CONCRETE. In thirty miles of concrete pavement laid in 25' sections there are about 6,300 sections. In a little less than 100 of these sections, small and rather unimportant cracks have come. However, if the first three and a half miles of pavement laid by Wayne county be eliminated from this record, because on this first stretch the methods were not so carefully thought out as they are now, the result will show a still better record. In other words, fully 3-5 of the cracks which have come are in the first three and a half miles, leaving less than forty cracks in about 5,700 sections, in the pavement which has since been put down. This is about 7-10 of 1 per cent of cracked section. We consider that an approximation of perfection which is worth while. This is made possible because the cement is carefully tested, the best graded and washed aggregates are used and there is a careful inspection at every stage of the operation.

You inquire as to the amount of materials required to make a cubic yard of 1:3:5 concrete. For such a mixture, using $2\frac{1}{2}$ " stone, you will require 1.03 barrels of cement, .47 cu. yds. sand, and .78 cu. yds. of stone. We believe, however, you should use a richer mixture than this in your pavement. For a mixture of 1:2:5 you will require 1.17 barrels of cement, .36 cu. yds. sand and .89 cu. yds. of stone. It is the opinion of the Wayne County Road Commissioners that gravel makes a better wearing pavement than crushed limestone, and we call your attention in this connection to the mixture used in Wayne county, mentioned above.

As to your belief that a good concrete pavement can be laid in your city for \$1.00 to \$1.25 per sq. yd., we think you are right, because your materials will cost much less than they cost in Wayne county, Michigan. The Board of County Road Commissioners have been paying \$1.12 for cement, 95 cents a ton for sand and 95 cents to \$1.10 a ton for pebbles. We suggest, however, that a few cents saving in cost be not urged too strongly in selecting the materials from which concrete is to be made. A few cents additional expense at the outset may mean many dollars in wearing value.

It is not easy to lay down a hard and fast rule in the matter of expansion joints, because concrete paving has been done in different places in different ways and been successful. Possibly it is not necessary to have an expansion joint in the center of the street if such a joint is made at the curb or outer edge of the gutter, where curb and gutter are laid in one. With a pavement 30' wide, however, you probably

would be on the safe side to put an expansion joint in the center.

The Wayne County Road Commission uses no expansion joints parallel with the course of the road because the concrete in this county road work is much narrower than is used on city streets. Expansion joints are placed every 25'.

The Mason City pavement, of which you speak, is laid with expansion joints 1" wide all along the curb and with another joint down the center of the street. The joints are cut transversely every 10' to 12½', making blocks of concrete from 10' to 12½' square.

We feel reasonably certain that the one-pour pavement will give good service at less cost. Wayne county, Michigan, has found it very satisfactory. There probably is a tendency when a top dressing is used to make the top surface of a material which is too fine. There is a large percentage of cement on the surface then which forms a dust.

Two years' wear on some of the Wayne county roads shows fairly good sized cross sections of the stones used in the concrete. If these stones are tamped in and if there is not an excess of trowelling to bring small particles to the surface, we believe the wearing service is much better. The more stone kept on top the better the pavement will wear.

There is no question at all that concrete gives the cheapest pavement in the world, and when we say cheapest we mean the maximum of service for a minimum of annual cost. As the cost must not be considered without looking ahead, the annual cost of the pavement is the real measure of its value.

Michigan Manufacturers Satisfied.

Michigan manufacturers of Portland cement claim a complete victory in their fight for readjustment of freight rates. They objected to an increase of from 4 cents to 5 cents per 100 pounds because they said it gave eastern manufacturers an opportunity to undersell them in their home state markets. The decision of the Interstate Commerce Commission is that rates from the East must be readjusted so that eastern mills will not have an advantage over those in Michigan in the home market. This, the Michigan manufacturers say, is just as much to their advantage as a 4-cent rate.

Nebraska Association Exhibits at Omaha.

There is announced an interesting feature of the Mid-West Cement Exposition to be held under the auspices of the Nebraska Cement Users' Association in the Auditorium at Omaha, Neb., February 6 to 9. This feature is the exhibit conducted by the Nebraska Association. In addition to the booths rented to manufacturers in all branches of the industry for the display of their products the Association has reserved booths 1 to 16 for a free exhibition of the cement products of Nebraska. The convention of the Association will be held in Omaha at the time of the show and a large attendance is expected.

USE OF SAND BLAST, ABRASIVES AND PNEUMATIC TOOLS IN CONCRETE SURFACING.

Various methods of surface treatment of concrete are coming into more extensive use as their value is appreciated. CONCRETE presents here some brief reports of experience with sand blast, with pneumatic bush-hammers and chisels and abrasive blocks. The first account given is of work in removing considerable concrete for purely structural reasons in applying a tile lining in New York City subways. It is no less interesting because the work was not for the beautification of the concrete surface, because it tells of an application of the same methods used in surface treatment proper.

Work done with pneumatic tools under very difficult conditions in subway stations in New York City by the Rapid Transit Subway Construction Co.,* is described by the resident engineer, Emil Elektorowicz, and given to CONCRETE through the courtesy of George H. Pegram, chief engineer, as follows:

In the construction of the subway stations which we did on account of subway station platform extensions, contract No. 1 called for tiling the walls and plastering the roof of the subway in front and over the extended platforms. On account of this we used bush-hammers very extensively and especially those of the Ingersoll-Rand Co. No. 00.

The walls of the subway being of flat arch construction, were originally designed so that the concrete face inside of the subway was flush with the flanges of the I-beams. In order to set the tile on these walls it was necessary to cut the concrete face of the wall about 1" deep in order to provide necessary space for the glazed tile.

On several stations, especially between Brooklyn Bridge and 96th Street, it was necessary to construct on the walls of the subway about four feet from the track level, a so-called sanitary base, which had to carry the glazed tile of the wall. In order to place this base it was necessary to cut in the body of the concrete wall a groove about 8" wide and 2" or 3" deep. This work was done by the same method.

The roof of the subway over the extended platforms had to be plastered, and the plastering could not be applied directly on the smooth surface of the concrete, so the roof had to be roughened by means of chipping hammers. All this work was done at night while trains were running. We used a specially designed and well adapted light scaffold which had to be removed and replaced at each passing of a train. For this reason a number of men had to be employed to signal the trains.

In addition to that the laborer, although he covered his mouth and nose with linen, and very often took a sponge in his mouth, became dizzy from the dust of the pulverized concrete and from the continuous jar of the bush-hammers. Under such conditions very strict supervision was necessary in order to keep the laborers in safety while the trains

*165 Broadway, New York City.

were in operation. Owing to those exceptional conditions the unit cost of this work was high.

In general, however, the work done by this method on vertical surfaces is about five times cheaper, and the work performed on the ceilings where the laborer has to work upward over his head is about ten times cheaper than that done in the regular way.

In order to get compressed air, we used small compressors of Westinghouse make, with a capacity of 50 cu. ft. per minute, which in order to be easily transferable from one station to another, were mounted on regular horse wagons on the street surface over the station on which the work had to be performed. The piping was carried down over suitable openings in the subway and the motive power was used from the third rail of the subway. A compressor of this type supplied plenty of air for three hammers of the No. 00 type.

All chipping tools were supplied by the Ingersoll-Rand Co., but the tools were sharpened in our own blacksmith shop, where compressed air was used and a specially designed tool was made in order to sharpen them as quickly as possible.

Bush-hammers equipped with dull points were used in many places for cutting the concrete where the old iron structure had to be removed and the new steel structures joined to the old one. This work was done to great advantage, especially at places where cutting by hand could not be done on account of the lack of space to swing the hammer. Similar hammers of heavier type were used for drilling rock for blasting.

Special Pneumatic Tools.

Several companies manufacturing pneumatic tools are giving particular attention to new designs to meet the requirements of such work.

William C. Armstrong, of the Ingersoll-Rand Co.,† says that one company using pneumatic hammers for bushing concrete reports that with the 51-H Crown hammer, fitted with a hexagon bushing and used in connection with a bush-chisel, 2¼" long and ¾" wide having a 4-cut blade, has given good results. Work in finishing concrete panels, balustrades, molding and surfaces under arches, has cost 5½ cents per square foot, when the cost of the tools, hose and compressed air is not figured—5½ cents representing the labor cost at 30 cents per hour.

When the concrete was 30 days old it is reported that 100 square feet of flat work can be done in a nine-hour day at 30 cents per hour, and on more intricate surfaces 40 to 50 square feet can be done. On the flat work it is possible to cover 10 per cent more surface when the concrete is but four days old, and on the curved and irregular surfaces concrete which is four days old can be covered at the rate of 50 to 60 square feet per day.

Sand Blasting.

As to the cost of equipment for sand blasting and the cost of labor, the J. W. Paxson Co.** supplies this information: One 20" portable sand blast machine, total height 52", the outfit including helmet to protect operator, nozzle holder and 12 hard iron nozzles, costs, in Philadelphia, \$187.50. To supply air for this machine at 20 pounds pressure through ¾" nozzle, a Westinghouse direct acting, steam-driven compressor, with a capacity of 80 cubic feet of free air per minute, is recommended—cost \$175. It might be necessary to have an air receiver and in this case a 20" diameter by 6' receiver with trap inside to catch moisture and fitted with gauge and safety valve, is recommended, to cost \$35. One-inch hose for the sand blast costs 50 cents per foot. With such an equipment about 600 square feet of surface can be thoroughly sand blasted in a day at a cost of four cents to five cents per square foot.

We figure the treatment of concrete surfaces at the rate of 8½—10½ cents per square foot, depending on the class of work to be treated and whether or not it is of high elevation. This, of course, makes the work more expensive as it requires more rigging than work which is near to the ground, owing to the fact that the surface of concrete must be treated in a very careful manner so as not to break the edge, writes the American Diamond Blast Co.*

In making the anchorages of the Manhattan bridge, the lower base was built of granite and the upper part of the arches of concrete. It was the idea of the city engineers to have the concrete match the granite as nearly as possible.

It was found that the concrete was full of board marks and had a heavy film of cement over the surface, giving a dull appearance to the concrete, with consequent lost character in the construction.

It was the intention of the engineers that these board marks and the film surface were to be removed so as to expose the aggregates and have it make the concrete match as nearly as possible the granite surface.

Floor Finishing.

Floor finishing machines operating abrasive discs are rapidly coming into general use for terrazzo, mosaic, granolithic and similar work because of the great advantages over the hand work with rubbing stones.

The American Art Granite Co., Chicago, has used a 2-disc stone surfacing machine for terrazzo floor work and Joseph H. Mitter, president of the company, says it eliminates the services of 10 men doing

†11 Broadway, New York City.

**1021 Delaware avenue, Philadelphia.

*Sand blast contractors, 50 Church street, New York City.

inferior work by hand. This machine is made by M. L. Schluetter.‡ The flexible discs are coupled to shafts so that they will yield themselves to any angle of the floor, and it is claimed for the machine that instead of cutting through uneven projections it grinds them down. The pressure may be varied from 5 to 150 pounds. It is also claimed for the machine that a set of carborundum block will surface from 5,000 to 7,000 square feet of flooring.

The Emerson & Norris Co.*† writes that carborundum bricks are used in finishing factory-made concrete products to remove the surface covering of cement and expose the selected aggregates in the product.

The company reports that in such work it is difficult at this time to estimate the cost of the surface treatment. Much depends upon the nature of the surface—the pieces varying a great deal, and it also depends to a very great extent upon the amount of surface covering removed. On ordinary work with flat surfaces a man covers 75 square feet a day, leaving a surface like that on a granolithic walk which has been in use several years.

Concrete Replaces Steel Dam.

The new concrete Hauserlake dam, located on the Missouri river eighteen miles below Helena, Montana, replaces the large structural steel dam of triangular section which was completed in February, 1907, and failed within a year after it went into service. This new dam is the design of Chas. T. Main, Boston, is of the ogee type and is 670' long from the head race canal on the east side of the river to the west abutment. It contains 88,000 yards of concrete.

The new dam has a 491' spillway. About 19' over the dam is a bridge supported by 24 piers 2' thick. From the foundation to the spillway crest it is 110', while the thickness of the dam, 86' at the base, tapers to 67.5' at the ogee section. At maximum capacity it stores 91,800 acre feet of water.

The construction of this new dam was started in 1908, but proceeded slowly as the cofferdams and temporary structures were washed out. In March, 1910, work was held up for several months by the main cofferdams being carried away. In building that portion of the dam below low water the Foundation Co. employed its pneumatic caisson method and work was commenced in August, 1910. A number of wooden caissons were sunk to bed rock, filled with concrete, the spaces between them being sealed with the same material. The cofferdam thus constructed proved efficient, the concrete being then laid on bed rock.

The present power house is the same as the old and the equipment includes five 2800 kw. units capable of producing 16000 horsepower under an ef-

fective head of 66 feet. This Hauserlake power plant of the United Missouri River Power Co. is one of the three large hydro-electric developments the company operates in this locality.

SILO OF CONCRETE WITH STEEL FRAMES FOR \$500.

The silo shown in the illustration was built by John Olson, Rock Rapids, Ia. It is 36' high and 16' in diameter, constructed of Anchor* continuous air space block, made in Anchor adjustable molds. The block has a groove in the back slab large enough to receive a $\frac{1}{4}$ " or $\frac{1}{2}$ " reinforcing rod. Ordinarily $\frac{1}{4}$ " galvanized reinforcing is used at each course.

This silo is fitted with Anchor continuous steel doors and steel door frames. The door jambs are made from 5" channels, crossed with 2" T-irons and $1\frac{1}{2}$ " angle irons for the ladder. On the back of the channel is riveted a 1" angle which extends into the air space in the ends of the block. This angle



Hollow-Wall Silo

iron has holes bored in it every 8" to receive the ends of the reinforcing wires which are passed through the holes and turned into the air space. This end air space is filled up with slu shconcrete. Between each two sets of doors the reinforcing rods pass all the way around the silo.

Between the steel doors and the channels used for the frames, round cork cushions $\frac{3}{8}$ " in thickness are placed. These cushions are 1" wide and extend all around the door, so that when the doors are in place the opening is really closed.

The silo has a reinforced concrete roof, 2" T-irons being used for rafters. These are placed 4' apart and all are fastened to a circle disc with bolts in the center. The spaces between the T-irons are then filled in with cheap corrugated iron. At the ends of

‡103 Canal street, Chicago.

*†163 N. Beacon street, Boston.

*Anchor Concrete Stone Co., Rock Rapids, Ia.

the rafters is a band iron 4" wide and 3/16" thick. This encircles the rafter ends. This band iron and the corrugated iron make the form for the concrete roof. Concrete was put on 2" thick and a reinforcing mesh then introduced; then 1½" more of concrete. The corrugated iron is found to save expensive wood forms and yet gives good results. The roof has a man-hole to be opened for filling and plate glass is used in the roof for the sake of light.

In finishing, the interior walls of the silo were covered with Portland cement plaster and then brush coated for water-tightness. The cost of the silo was \$500 and this includes a profit of \$100 to the builder. The walls are 9" thick, and 32' of the ensilage is above grade and 4' 4" below.

VARIATIONS IN COSTS OF SIMILAR CONSTRUCTION JOBS.*

Reference has been made† to the difficulty in obtaining really accurate results by ordinary methods of cost keeping. To illustrate this still more clearly and to show further the need of more thorough treatment even of so simple a piece of work as laying mass concrete, two jobs may be taken which in an ordinary force account would have nearly identical description but which even a superficial study will show to be very different.

The description of the two jobs illustrates the more important differences which affect the variation in cost of mass concrete.

On Job A the following conditions will be assumed:

1:2:4 hand-mixed concrete.

Gravel screened to separate sand and gravel.

Sand and gravel wheeled in barrows 100 feet.

Cement in barrels hauled 5 miles in wagons.

Wet concrete wheeled 100 feet and dumped to place.

No forms.

Wages of labor, \$1.75 per 8-hour day.

Conditions such that concreting must be stopped on the average one hour before quitting time, when men are set to digging.

The actual average cost by the authors' estimate of the labor on the concrete under the above conditions—including placing and ramming and time of foreman and in addition 15 per cent for superintendence, overhead charges, etc.—would be \$2.51 per cubic yard of concrete in place. An ordinary force account or cost keeping record, if accurately taken, ought to give this figure. On the other hand, if the costs are kept by one who is not constantly on this part of the job, perhaps no allowance may be made for the variable time, averaging one hour per day, upon which the men are at work digging. With this item neglected, the records would show \$2.87 per cubic yard for labor.

In this connection it may be well to state that force or cost keeping accounts kept by inexperienced

men are apt to indicate a lower cost of work instead of a higher cost, as assumed above, because of the difficulty of taking accurate records.

On Job B the following conditions will be assumed:

1:3:7 hand mixed concrete.

Broken stone delivered to mixing platform, and charged as material.

Sand wheeled 100 feet in barrows.

Wet concrete wheeled 25 feet and dumped to place.

No forms.

Wages of labor, \$1.35 per 10-hour day.

The actual average cost, by the author's estimate, of the labor of concreting under the above conditions, including placing, ramming, and foreman, and in addition 15 per cent for superintendence, overhead charges, etc., would be \$0.83 per cubic yard of concrete in place.

If wages are assumed to be the same as on Job A, namely \$1.75 per 8-hour day, the labor cost would be \$1.33 per cubic yard of concrete in place.

A comparison of these prices with the cost on Job A, namely, \$2.51 per cubic yard for labor with careful timekeeping (or \$2.87 with a less carefully kept force account) illustrates the variation in cost which may occur on two jobs apparently similar. Yet every one of these variables may be allowed for in advance if the unit costs are known.

In thin walls or conduit construction, the forms are expensive, often costing more than the labor on the concrete. The placing of steel reinforcement also involves additional labor and delays the concreters. In such types of construction the difference in cost of different jobs will be much greater than in the examples considered. Simple cases have been selected for illustration because in these the differences are less evident. The methods of unit costs account for such variables and are therefore even more valuable in complicated than in simple work.

Every engineer and contractor who is required to make careful estimates of intricate work realizes the inaccuracy of ordinary methods of keeping costs and the necessity for a system by which careful records upon one job will indicate the probable cost of another subsequent job.

On the jobs considered, the cost of Job A gives absolutely nothing upon which to base the estimate for the cost of Job B, except that an experienced man who is right on the job and who is accustomed to guessing may form a fairly close "guess" of the cost of the other work. Innumerable sets of conditions might be cited, similar and yet enough unlike to mislead the judgment.

No doubt very accurate estimates are made by the ordinary guesswork methods by men possessed

*[From *Concrete Costs*, by Frederick W. Taylor and Sanford E. Thompson, Copyright, 1912, by Frederick W. Taylor.]

†In the December, 1911, issue of CONCRETE.



*It is better to use the
Best—that's*

SAYLOR'S

ESTABLISHED 1868

Portland Cement

The oldest American Portland Cement. Used largely by the U. S. Army and Navy Corps of Engineers for locks, dams, walks, buildings, etc. Quality and color uniform.

Coplay Cement Manufacturing Co.

COPLAY, PA.

Sales Offices: } Land Title Bldg., Philadelphia
} Fifth Ave. Bldg., New York.



"NEW CASTLE"

THE BEST

PORTLAND CEMENT
BY ACTUAL TESTS
FOR ALL PURPOSES
THAT CAN BE MADE

ASK ANY CUSTOMER

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



ATLAS
PORTLAND
CEMENT

MAKES THE BEST CONCRETE



The cement used exclusively by the United States government for the six enormous double locks and Gatun Dam on the Panama Canal.

**NON-STAINING
ATLAS-WHITE**

is a true Portland Cement, pure white and non-staining.

If your dealer cannot supply you with Atlas, or Atlas-White, write to

The ATLAS Portland CEMENT Co.

30 BROAD ST., NEW YORK

Morris Bldg., Phila., Pa. Corn Exch. Bank Bldg., Chicago, Ill.



Largest productive capacity of any cement company in the world—over 50,000 bbls. per day



"CONCRETE" is the leading trade journal devoted to the manufacture and use of Portland cement. It interests the largest number of the right kind of readers and is, therefore, the most valuable to its advertisers.

Concrete Publishing Co.
Detroit, Michigan



**Where Concrete
is Best for the
Work**

BURT
is Best for the
Concrete

GUARANTEED TO PASS ALL STANDARD SPECIFICATIONS

The Burt Portland Cement Co.
Mills and Office, Bellevue, Mich.

ALL AGREEMENTS ARE SUBJECT TO DELAYS OCCASIONED BY STRIKES, FIRES, NON-RECEIPT OF MATERIALS OR OTHER CAUSES BEYOND OUR CONTROL.

Queen City Brick Machine Company

HELM
BRICK AND BLOCK
PRESSES.



TWO PIECE
BLOCK DRY WALL
SYSTEM.

ADDRESS ALL COMMUNICATIONS
TO THE COMPANY

Traverse City, Mich.,

**JANUARY
6, 1911**

**This is a message to thousands but
a Personal Question with YOU:**

Will you accept FREE and PREPAID the latest book on concrete?
Not a catalog but a regular HANDBOOK on CONCRETE - right up to the minute-
the LATEST information on these SIXTEEN IMPORTANT SUBJECTS:

--The field for concrete--	Various building systems--	Ways of making product
--Selecting materials	--Plant arrangement	--Weights of materials
--How to proportion them--	Waterproof building	--Table of compression
--How to form product	system illustrated	working values
--How to cure product	--How to estimate	--Hints on selling
--Steam curing	--Comparative tests	--Profits in concrete

It took time and money to gather this valuable information. This book should sell for no small sum but we are now even asking if we may mail it to you ABSOLUTELY FREE. There is data in it which will make you keep it for years, even carry it with you. You would not be without it or sell it back to us for quite a sum if you could not get another copy.

THE EDITION IS LIMITED so you better send for YOUR copy RIGHT NOW. We can only hold it for you just a few days, long enough to get your answer. We want you to have a copy of this HANDBOOK and also our big, illustrated machinery catalog if -

- you want to know how to make sand worth \$6.00 a yard.
- you want about \$2.00 of that to be YOUR profit
- you want to make from \$10. to \$50. daily
- you are thinking of going into the concrete business
- you are now in the concrete business
- you want to know how to make DRY WALL concrete blocks or brick -

But if not, then we would not even sell you these books or desire to tell you about HELM PRESSES - how they are built in different sizes - for hand or power - combined for brick and blocks - about their wonderful capacity and pressure, or their labor saving and profit making features.

As a reader of this paper you are entitled to this offer, so just send the coupon TODAY, RIGHT NOW. Merely sign and send it. No OBLIGATION.

Yours truly,

Dio.CJH/B

QUEEN CITY BRICK MACHINE CO.

P.S. Just tear this off and mail Name _____
it to QUEEN CITY BRICK MCH. CO.,
441 Bank Bldg., Traverse City, Mich. Address _____

VARIATIONS IN COST OF SIMILAR CONSTRUCTION

(Continued from page 68)

of extraordinary judgment who have had years of practice upon the work in question. However, even such men will fall down and will make serious mistakes when called upon to estimate in a line of work with which they have had a very slight experience.

ADVANTAGES OF CONCRETE

(Continued from page 30)

ter of taste and personal preference, and the man who likes the looks of brick better than concrete need not forego the advantages of concrete as a structural material in his building. Reinforced concrete buildings may be constructed so that only the framework is of concrete. The curtain walls may be of almost any material as in the construction of skeleton steel buildings.

Comparative Cost.

If the statements as to the merits of concrete construction are correct then there is no argument against the adoption of the material where fireproofness and other advantages are demanded. It may be shown quite as conclusively that concrete construction is actually cheaper than burnable construction. In this, ultimate cost, rather than first cost, must be considered. While a detailed discussion might be gone into in this connection, let it be assumed that a building costing \$100,000 in mill construction, costs \$115,000 in reinforced concrete construction, and assume that the contents are valued at \$200,000 and that the structure is used for general manufacturing purposes, such as a shoe factory, a woolen mill, a cotton factory or a tannery. Consider this tabulation:

COMPARATIVE COST OF BUILDINGS OF CONCRETE AND MILL CONSTRUCTION.

Initial cost of Building	Mill Construction \$100,000	Reinf. ed Concrete \$115,000
Yearly charges:—		
Interest at 6 per cent....	\$6,000	\$6,900.00
Taxes at 1 per cent.....	1,000	1,150.00
Fire Insurance:		
Building	at 70 cents 700	at 25 cents 287.50
Contents	at 90 cents 1,800	at 60 cents 1,200.00
Depreciation	at 1.25 per cent 1,250	at 0.25% 287.50
Items charged against mill construction only:		
(a) Loss due to vibration, assume	450	
(b) Increased light, 1 per cent increase in efficiency of labor. Assume labor equal to 1/4 value of contents or \$50,000....	500	
(c) Vermin losses	100	
(d) Heating charge	100	
(e) Protection against fire at 0.5 per cent on value of 50 per cent of building and contents.....	750	
	<u>\$12,650</u>	<u>\$9,825.00</u>

Annual saving of concrete over mill construction.....\$2,825

If the saving of \$2,825.00 per year be capitalized at 6 per cent, it would represent an investment of \$47,083.00. In other words, a concrete building, though 15 per cent higher in initial contract cost than a mill building of similar design, would save each year 2 8/10 per cent on all fixed charges. Stated differently, an

owner can afford to pay 50 per cent more for a concrete building than for a mill building and still save money on his investment.

HOW TO MAKE LEAKY BASEMENTS WATERPROOF

(Continued from page 34)

tion by the upward pressure, a factor of safety is supplied by the weight of the floor, the six-inch floor weighing 72 lbs. per sq. ft. The total upward pressure being 187.5 lbs. per sq. ft. and the weight of the floor being 72 lbs., the floor must merely resist an upward pressure of $187.5 - 72 = 115.5$ lbs. per sq. ft., while, as we have seen, it was designed to resist an upward pressure of 187.5 lbs.

Reinforced Floor Thinner.

This gives a hint as to how the thickness of the floors may be reduced. In the case of the plain floor it was seen that the weight being 134.5 lbs. the actual pressure the floor would be called upon to resist would be $187.5 - 134.5 = 53.5$ lbs. By a cut-and-try process it will be found that a nine-inch floor will take care of the upward pressure, but as there is no factor of safety it will be an expensive experiment in case the floor does crack. What factors of safety have we? In the case of the plain floor designed to resist an upward pressure of 187.5 lbs. the weight of the floor left an upward pressure of 53 lbs. only, and the factor of safety is $187.5 \div 53 = 3.54$. In the reinforced floor the weight of the floor subtracted from the total upward pressure left an upward pressure of 115.5 lbs. and the factor of safety is $187.5 \div 115.5 = 1.62$. Considering the reduced factor of safety the writer is inclined to pay the extra twenty per cent for a plain concrete floor, waterproofed, and not consider reinforcement.

This, however, is not a general rule but must be worked out for all cases that come up. There are many instances in which a reinforced concrete floor will be the best to use. Sometimes a floor is designed with a regular framework of beams under it set down into the earth, the floor being a reinforced concrete slab spanning between these beams. What to do in any particular instance must be determined on the spot by an engineer skilled in such work. Enough has been given, however, to show that it is not always possible to put down a thin floor containing a first-class waterproofing compound, but that the amount of the upward pressure first should always be taken into consideration.

On the subject of side walls so much has been written that it is presumed the readers are well informed. The requirements are a tight wall, as tight as can be made, with the waterproofing compound mixed with the concrete and a water-tight coat of mortar on the outside, or else a two or three-ply layer of asphalted paper or burlap on the outside to keep the water from getting through the wall. All junctions of walls and floor should be carefully sealed.

Making Walls Waterproof.

The owner must concentrate his efforts on keeping the water out, for once it gets in the expense is greatly

increased in the endeavor to keep clear of the trouble. When water does come through a wall the water pressure per square inch is equal to $0.433 \times$ the head in feet. If the pressure does not exceed the adhesive strength of mortar it may be possible to plaster the wall with a water-tight coating. If the pressure per sq. in. exceeds 10 lbs. it will be an exceedingly difficult and expensive process to try to plaster the wall. The work should be done from the top downward. Proceed by making strips one foot wide with six-inch strips between from the top of the wall to the bottom, and let the narrow strips remain without treatment until the work on the wider strips is done. The wider strips are to be treated first by raking out all joints for a depth of an inch and washing the surface with an acid to clean off all grease and dirt.

After cleaning off the surface wet it thoroughly with clean water, after which apply a brush coat of neat cement paint and then apply with considerable pressure a thin coat of mortar. This mortar should have mixed with it some approved waterproofing compound. The lower coat should be scratched, and when it has set just enough to carry the weight of the second coat apply a second coat. The work should be carried clear to the bottom of the wall and great pains taken to secure a properly tight joint with the floor at the bottom. The water will now be coming through the narrow strips, and at least twenty-four hours after the wide strips have been made tight the narrow strips should be treated in the same manner, with this exception, that about six inches at the bottom should be left without treatment for a couple of days in order to permit the work to set thoroughly by letting the leaking water come through these spaces at the bottom. After finishing the narrow strips, with the exception of the holes at the bottom, put over the work a wash coat of neat cement and then apply a third coat of plaster. After this has set proceed to close the holes at the bottom by filling them with a very rich mixture of waterproofed plaster and hold it in place by pieces of board wedged tightly against the plaster. The faces of the boards may be soaped so they can be removed in a couple of days without tearing the plaster.

When properly done this will make the leaky wall tight. The reader must pay great attention to the instructions that the work may be properly done. The plaster must be put in place with as great pressure as the mason can apply. Good, careful, conscientious work is required throughout and it is not cheap. Let the contract to a man with considerable experience even at a high figure before trusting a low-priced amateur.

HOUSES, PRACTICALLY ALL CONCRETE, AT GARY

(Continued from page 36)

ment of sectional forms, concrete mixers and workmen is expected to be kept in motion throughout the winter and by next spring many of these structures will be occupied by operatives of the Gary plant.

The success of the Gary enterprise has prompted a group of Chicago and Joliet, Ill., capitalists to

form a company which expects to erect 200 monolithic houses in Joliet, Ill., in the near future. Their plans will follow the Gary plans very closely. Fred M. Stults, one of the concrete experts on the Gary job, will, it is understood, have charge of the new project.

DATE AND PLACE OF N. A. C. U. CONVENTION NOT YET DECIDED.

Just as CONCRETE goes to press announcement comes from the headquarters of the National Association of Cement Users that "this Association will without doubt hold a convention this winter but the time and place are not yet decided."

The Decline of Natural Cement.

The rise and fall of the natural cement industry in the United States is shown by Ernest F. Burchard, of the United States Geological Survey, in "The Cement Industry in 1910," recently issued by the Survey as an advance chapter of "Mineral Resources for 1910." A dozen years ago the production of natural cement was nearly 10,000,000 barrels; last year it was but 1,139,239 barrels. It seems that it is a case of the survival of the fittest and Portland cement has largely displaced natural cement. The following table tells the story:

PRODUCTION OF PORTLAND CEMENT AND NATURAL CEMENT IN THE UNITED STATES, 1899-1910 (IN BARRELS).

Year.	Portland Cement.	Natural Cement.
1899	5,652,266	9,868,179
1901	12,711,225	7,084,823
1903	22,342,973	7,030,271
1905	35,246,812	4,473,049
1907	48,785,390	2,887,700
1909	64,991,431	1,537,638
1910	76,549,951	1,139,239

Natural cements differ from Portland cements in the following important particulars:

Natural cements are not made from carefully prepared and finely ground artificial mixtures, but from natural limestone rock.

Natural cements are burned at a lower temperature than Portland, the mass in the kiln never being heated high enough even to approach the fusing or clinkering point.

Natural cements, after burning and grinding, are usually yellow to brown in color and light in weight, having a specific gravity of 2.7 to 3.1—that is, the cements weigh from 2.7 to 3.1 times the weight of water. Portland cement is commonly blue to gray in color and heavier, its specific gravity ranging from 3 to 3.2.

Natural cements set more rapidly than Portland cement, but do not attain so high a tensile strength.

Portland cement is a definite product, its percentages of lime, silica, alumina, and iron oxide varying only between narrow limits, while brands of natural cements vary greatly in composition.

Concrete Piles, Steel-Encased.

Foundation and underpinning work in cities involves unusual problems, owing to the tremendous weight to be supported in this age of giant structures. Concrete, in the hands of competent engineers, has solved all of them. The use of concrete piles is now recognized as one of the most important factors in successful construction of foundations.

Concrete molded in place possesses many undeniable advantages and when encased in a suitable cover, makes a very efficient pile. In using piles of Simmons type* a steel pipe of any convenient diameter (ordinary pile size) and of any convenient length (4 to 20 feet) is driven directly, with a spe-



Testing a Simmons Pile

cial driving head. At the point, a cast iron shoe is provided, fitted with a hole for jetting, if desired. In some soils, especially sand, the pipe is driven without a point and the sand removed from inside the pipe as the driving proceeds.

This form and method of driving are of special advantage for underpinning and where head room is limited. Piles of any ultimate length are readily built up as the shell is driven. Over 200,000 linear feet of the Simmons piles are used in New York City along, supporting the dead loads of buildings and the live loads of railroads. The company carries a stock, so that any desired length of pile may be secured. A pile has been driven 60 feet without getting out of alignment or buckling. Piles of this type may be hammered, jacked or jetted into place.

Typical tests of these piles, reported by the makers, include one in which a 12" pile in five sections was jacked down in sand strata to bed-rock, 33 feet. It was filled with concrete and supported 135 tons of dead weight without deflection or other change; depression, $1/32"$. A 9" pile, of eight 7' sections, was hammer-driven until a resistance of 80 tons was shown, to carry live load. When tested with an electric bulb in interior for perfection of alignment, it was found to be perfectly true.

This method of concrete piling bids fair to be very widely adopted all over the country, for all

classes of buildings in which piling is required. Wood piles are found to be satisfactory enough as long as they are constantly covered with water. But, owing to constant changes in levels, due to building operations, water is continually drained from one point to another, with the result that wooden piles decay and the building settles, with resultant heavy loss and expense.

Hand Book on Brick and Block.

C. J. Helm has written a book on concrete block and brick making. Ordinarily Mr. Helm is engaged in the manufacture of concrete machinery, but he has had a lot of experience in the concrete business, the practical end of it, and he decided to put his ideas into type.

"A Hand Book of Concrete Brick and Block Making" is the title of the book, which contains a vast amount of valuable information of special interest to brick and block manufacturers and others who contemplate entering the business. The book is published by the Queen City Brick Machine Co., 441 Bank Bldg., Traverse City, Mich., and is sent without charge to interested inquirers.

The main portion of the text is devoted to the following sixteen subjects: The field for concrete, selection of materials, how to proportion, how to cure product, plant arrangement, how to estimate, comparative tests, table of compression working values, ways of making products, various building systems, forming the product, steam curing, a waterproof building, system fully illustrated, weights of materials, hints on selling, profits in concrete.

While of course the matter is written with special reference to the particular brick and block made on the company's machines, most of the information is general in its character and is much more reliable than some of that contained in cloth-bound books published in the past by authors who wrote books as a means of livelihood.

It is seldom that a piece of business literature contains so great a fund of general information and we know our readers will welcome this notice of a valuable hand book.

The Queen City Brick Machine Co. manufactures mechanical presses which turn out concrete brick or concrete block for two-piece wall construction. The material is mixed quite wet and subjected to 80,000 pounds pressure. Buildings erected of these products are seldom furred and lathed, interior plaster being applied direct to the walls. The company publishes a machinery catalog listing its presses, which must not be confused with the hand book mentioned above.

The Aberthaw Construction Co., Boston, Mass., was the successful bidder for the contract of erecting the new reinforced concrete machine shop of the Lamson Consolidated Store Service Co., Lowell, Mass. The building is to be 150' x 50' and four stories high, with brick curtain walls. Lockwood, Greene & Co., Boston, Mass., are the architects.

*John Simmons Company, 101 Centre St., N. Y. C.

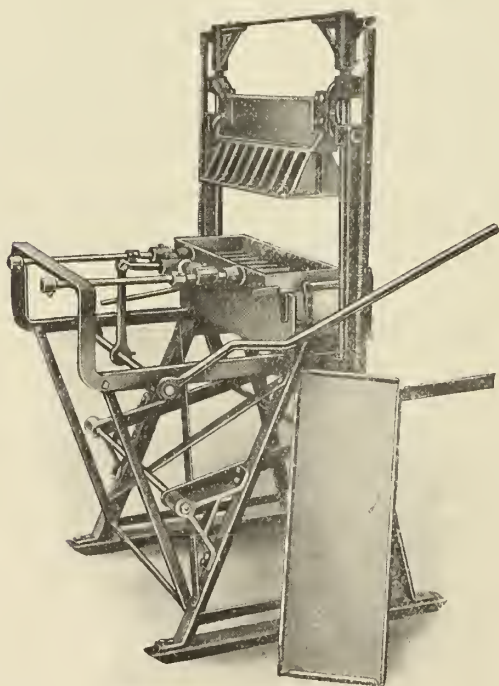
NEW MACHINERY, NEW METHODS AND NEW MATERIALS OF INTEREST TO CONCRETE WORKERS.

Under this head CONCRETE will, from time to time, print brief descriptions of such new devices, apparatus and methods as are used in connection with the cement and concrete industry. This department has been established for the benefit of our readers, with a view to keeping them informed upon the developments made in the business. In order to insure notice, the device mentioned must be absolutely new or an important improvement upon some device, method or material already on the market.

Advance in Brick Machine Design.

Gradually the concrete brick is coming into its own. Those who have watched the rapid advance of almost every department of the concrete industry have remarked the tendency of the building block business to outstrip the manufacture of concrete brick. This condition has probably been partly due to the small attention originally paid to the proper design of brick-making machines.

Many concrete machinery manufacturers have noticed this and have set to work to get out entirely new



New Crescent Brick Machine

machines or to bring brick machines already on the market up to the highest point of efficiency.

The brick machine shown here is the latest product of the Raber & Lang Mfg. Co., 802 Mill Street, Kendallville, Ind. The "Crescent" vertical tamping brick machine is equipped with a patented hopper, stripper and finisher attachment which is said to cut down the labor cost of manufacturing brick by one-half. Another important feature of this particular machine is the

facing plate. By the use of this attachment, the material for facing a batch of brick is accurately measured and placed in the molds, automatically. The manufacturers look to see this attachment do much for the concrete brick industry as it brings the cost of special face brick down very close to the cost of plain brick as originally made.

Concrete Sun Dial Base.

The use of concrete in garden and lawn ornamentation is certainly on the increase. Concrete products manufacturers report a growing demand for lawn benches, garden seats, vases, pergolas, etc.

We show here a new design of sun dial shaft, made in a new mold just added to the line of the Architectural Mold Co., 1117 E. Warren Ave., Detroit, Mich. This unit was made in two sections, base and shaft. The mold for the shaft is part of a sectional mold for a full size porch column. Thus a plant equipped with a mold for this particular design of large column is also in shape to turn out sun dial bases to order.

Home owners with gardens are coming to look favorably upon the sun dial as a feature of the ground plan and concrete is the natural material to be used in erecting a base for the dial proper.



"Percival" Concrete Railroad Tie.

For more than fifteen years H. E. Percival has been at work upon the design and methods of manufacture of a concrete railroad tie which should overcome the objections that have been raised against concrete ties in general. He believes that all of his problems have been solved and as a result of his belief the Universal Concrete Tie Co. has been incorporated, with principal offices in the Whitney-Central Bldg., New Orleans, La.

The Percival tie consists of a molded base, reinforced by heavy corrugated steel bars, so placed as to form a truss. Rounded edges on the base minimize the weight of the tie and offer a protection against breakage in handling. The middle portion of the tie is V-shaped, providing for ease in tamping and permanence of location in the road bed. For ordinary road beds, the ties are molded to weigh 375 pounds apiece, but for heavy traffic they run as high as 450 pounds, on trunk lines. In terminals and at

(Continued on page 76)

Quality Is
Economy

KONKRETO

*on a Concrete Factory Floor
is a Three-fold Saving*

It saves machinery from the wear of those flinty grits in concrete dust.

It saves finished goods--especially varnished goods--from those same sharp grits.

It saves workmen from the nose- and throat-troubles caused by those cutting grits.

It makes the floor like Tiling.

The Varnish
That Lasts
Longest

Murphy Varnish Company

FRANKLIN MURPHY, President
Associated with Dougall Varnish Company, Limited, Montreal, Canada

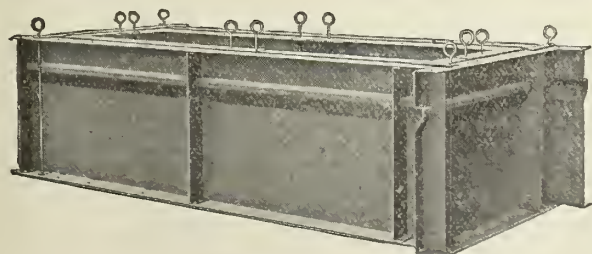
NEWARK,
N. J.
CHICAGO,
ILL.

You Owe It to Yourself

to investigate the profits there are to be had in manufacturing the **Automatic Sealing Burial Vault**. There are hundreds of these sold in almost every state. **Hundreds of Undertakers** are selling them and giving their endorsement over all others. You probably have had them tell you so. **The Absolute Certainty and Simplicity** of the **Automatic Seal** gains the confidence and support of every up-to-date undertaker.

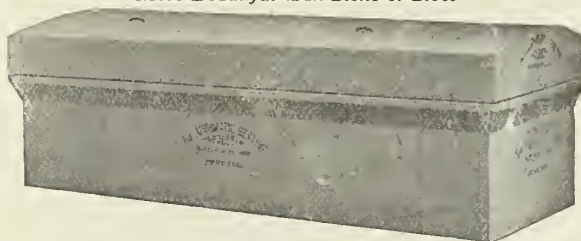
In Our Own Factory where our **Adjustable Bessemer Steel Molds** are made you will find only skilled mechanics who make **Construction and Designing of Vault Molds** their **Exclusive Business**. Today our **Adjustable Bessemer Steel Molds** represent perfection in construction and workmanship. That is why we **Guarantee Them Unconditionally**. More of these molds sold within the last twelve months than any other on the market.

See our Display Booth 5 Chicago Show.



Adjustable Bessemer Steel Molds

More Beautiful than Stone or Steel



As Enduring as the Ages

Better write us at once and get our beautifully illustrated Booklet.

The Automatic Sealing Vault Co.
Peru, Ind.

NOTE—Try an order of our A. S. V. Waterproofing Solution especially prepared for all kinds of cement products requiring perfect waterproofing. Put up in five gallon cans at \$1.00 per gallon.

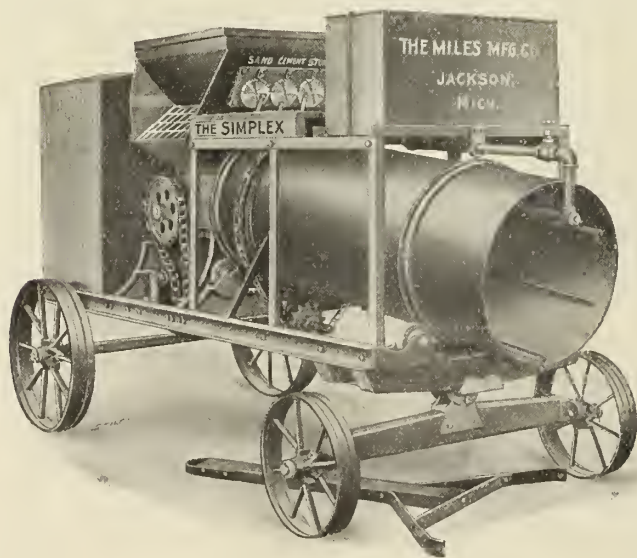
grade crossings a 9' 10" face tie is recommended. Owing to their greater bed and face area, it is estimated that 2,000 of these ties will replace 3,000 wood ties to the mile, under maximum traffic conditions.

A prevailing objection to concrete ties has been the fact that they possessed little or no resiliency. The absence of this quality resulted in undue strain on running gear. This difficulty is overcome in the Percival tie by using a hardwood cushion 14" long and 2" thick, cut the width of the tie. Two bolts secure this block to the base of the tie, engaging in a block of reinforced Babbitt metal which has been placed in the concrete at the time the tie is under construction. Rails are attached to the block by the shoulders of the bolts referred to, or by collars through which the bolts are slipped before they are inserted.

Continuous use for more than five years in several railroad terminals has demonstrated the fact that the tie is long past the experimental stage, and the company will push its manufacture and sale.

Improvements on "Simplex" Mixer.

Several important improvements have been made on the "Simplex" continuous mixer. The designer of this machine has added a new proportioning device which he claims is absolutely positive and accurate in operation. The sand, cement and aggregate



"Simplex" Mixer With New Feeding Device

gates are made to feed continuously from their respective hoppers and the builders of the mixer aim to give the materials a preliminary dry mix before they even reach the mixing trough.

The photograph reproduced here shows the new type of mixer, with sand shields removed, showing the simple gearing. The feeding device is controlled by a clutch within easy reach of the operator. By the addition of the positive proportioning device, the builders believe they have combined in this machine two most important features for continuous mixing

We are the sole agents in United States, Canada and Mexico for

Meyer's German Cement and Liquid

FOR PATCHING ALL KINDS OF CEMENT WORK

We have a large stock on hand. Prices as follows:

1 Kilo Can.....	\$1.50
2 Kilo Can.....	2.75
4 Kilo Can.....	5.00
Barrel powder, 50 Kilos, per kilo.....	.80
Demijohn liquid, 68 Kilos, per kilo.....	.80
All prices f. o. b. New York City.	

We also handle Dugan's Invisible Patcher for patching all kinds of Limestone and Bluestone.

MICHAEL COHEN & CO.

St. James Bldg., Broadway and Twenty-sixth St.,
NEW YORK CITY.

—the preliminary dry mix and the rolling mix in the trough. The Miles Mfg. Co., Inc., 315 E. Franklin St., Jackson, Mich., manufactures this mixer as well as the Miles block machine and a general line of concrete equipment.

Will Handle Full Line of Concrete Machinery.

A long-handled tool for cutting joints in concrete cross-walks has been added to the line of the Arrowsmith Concrete Tool Co., Arrowsmith, Ill. This tool enables the sidewalk contractor, in laying his cross-walk, to cut four joints in it at once. It is equipped with the familiar Arrowsmith long handle, obviating the necessity of the operator crawling along the work on his knees.

The Arrowsmith company has branched out. It announces that its sidewalk and paving tools will hereafter be manufactured in bronze as well as in malleable iron. It has established a southern branch at Atlanta, Ga., from which all southern shipments will be made.

The company has been manufacturing long-handled finishing tools for five years, in fact was the first company to put such tools on the market. Now it has added a complete line of general concrete machinery which it will sell under the same guarantee that has been made effective in its past business. This is an important step for the company, as it means a considerable enlargement of its organization and will be felt in the concrete field.

Railroads and Concrete Fence Posts.

The increasing cost of fence posts is not only affecting the farmer, but also the railroads of this country, which spend millions of dollars each year in replacing decayed and burned fence posts along their rights of way. As this item of expense is one of the largest in the Maintenance of Way Department, a great deal of attention has been paid to the concrete post.

Not long ago the New York Central Lines conducted a series of tests on concrete posts made with

ASBESTOS "CENTURY" SHINGLES

"The Roof that Outlives the Building"

YOUR clients will pay just about the same for an Asbestos "Century" shingle roof as for any other roofing that is ordinarily put on first-class buildings.

But consider their durability—their immunity from fire risk—their freedom from repairs and painting.

You find that Asbestos "Century" Shingles are the cheapest roofing known to the building trade.

We are often asked why we do not charge more for them.

The answer is obvious—it is better business for both the building trade and ourselves to sell a million roofs at a fair price than to charge double the money and sell only a hundred thousand roofs.



Asbestos "Century" Shingle Roof—Quintard Estate, Portchester, New York.
Re-roofing contractor, John Gery, Patterson, N. J.

As the matter stands, *two hundred million* Asbestos "Century" Shingles were sold last year at a price that enables the architect and builder to specify them in competition with other roofing—and brings us a conservative profit on the cost of making.

It will pay you to look into Asbestos "Century" Shingles. You can get them in shapes to suit any architectural scheme—in several sizes—and in three colors: Newport Gray (silver gray), Slate (blue black) and Indian Red.

Send for quotations, and booklet "Keasbey 1912".

Keasbey & Mattison Company, Factors

Ambler, Pennsylvania

Branch Offices in Principal Cities of the United States

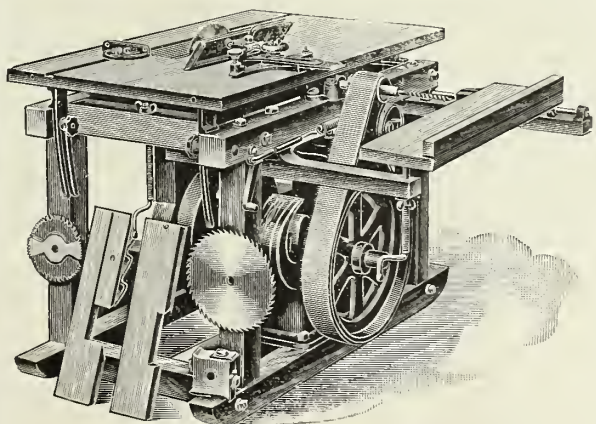
The Auxiliary Ratchet Lever: insures more Power, than the ordinary one lever bender. Our BAR BENDER No. 5 is specially valuable in Reinforced Concrete work. Portable, instantly adjustable to all shapes of stock up to 1 1/4". Send for booklet of all sizes of improved bar, eye, "U" and ring benders.



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114 No. Jefferson St. Chicago 25 Cortland St. New York City

"AMERICAN"

CONTRACTORS' PORTABLE SAW BENCH



SEE IT AT THE CEMENT SHOWS
IN NEW YORK AND CHICAGO

This is one of the greatest money-makers a contractor can have, easily saving 10 to 15 per cent on every concrete job, in cutting lumber for the forms. You may have it with either gasoline or electric power, built in.

Write us for information and prices.

American Saw Mill Machinery Company

84 MAIN STREET
HACKETTSTOWN, N. J.

1380 HUDSON TERMINAL
NEW YORK CITY

Don't fail to visit our exhibit at the New York Cement Show, Jan. 29-Feb. 3, 1912

White Sparkling

Crushed Granite

Graded in several sizes for concrete work. This is the best material for facing artificial stone, monolithic concrete work, stucco, floors, sidewalks, etc.

Concrete made with this material is strong, dense, moisture-repelling and has the appearance of natural granite, molded to any form. Send for complete information and sample.

Monarch Mining Co. 120 Culver Ave., Jersey City, N. J.

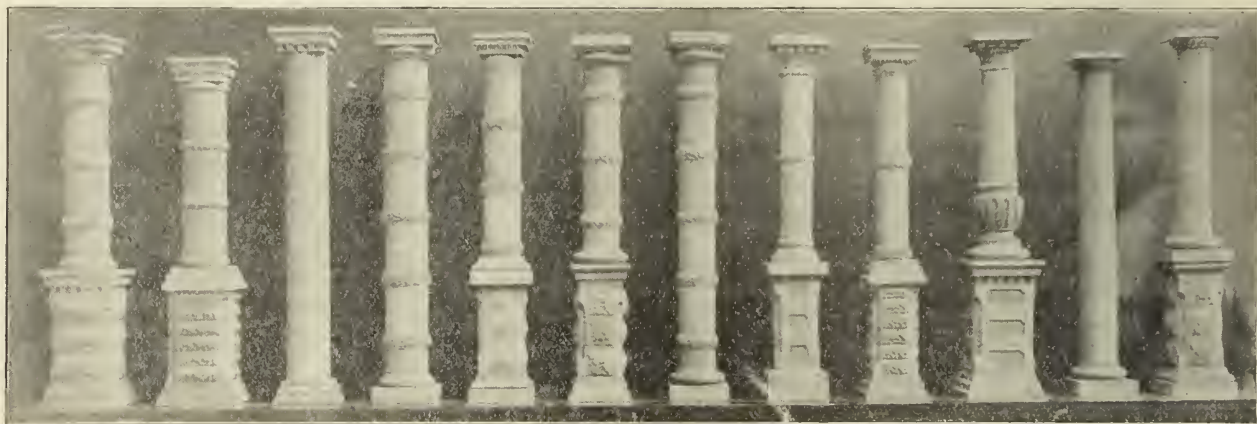
SEND FOR FREE SAMPLE

Every reader of this paper should have a sample of this material. It will be sent free to any address. Write today.

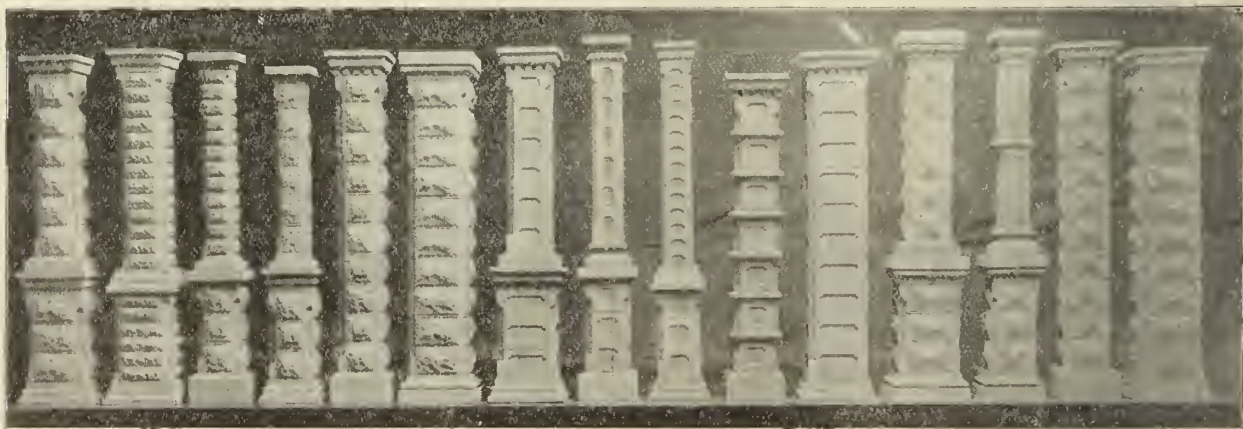
molds manufactured by the Ohio Post Mold Co., Toledo, Ohio. Posts were placed in the ground, 16' apart, and a panel of woven wire stretched between; a 200-lb. bag of sand was then swung pendulum-wise against the panel. It was impossible to destroy the efficiency of the fence in this manner, and it was also impossible to break down the post, except by applying the bag of sand repeatedly against the face of the post. This was a very severe test, as conditions of this kind are not encountered on the ordinary farm with ordinary domestic stock.

The railroads from coast to coast are installing plants in their various divisions for turning out concrete fence posts in large quantities, and in a few years the wood fence post will be replaced by the more sightly concrete post.

added to the Simpson line. The sales manager was puzzled to know how to show all of the designs within the space allotted to the company, and still have any room left. Then he hit upon the plan of having the designs made in miniature. For the last two months workmen have been employed especially to make diminutive molds, from which fac similes of the column blocks may be turned out. Miniature columns, built up of the product of these small sized molds will be shown at the back of the Simpson exhibits, and will make a beautiful and striking display. Duplicates of the small blocks will be shown as units also. They are to be handled by visiting block makers and porch men in building up various attractive combinations, so that they may decide just which molds they desire for regular use.



These Models Show the Present Status of Porch Column Design



Miniatures of Simpson Porch Columns—A Line of Rock-Face Types

Concrete Porch Columns in Miniature.

Manufacturers of unusually large lines are confronted by a real problem at Cement Show time. The question is how to display everything of interest on the list within reasonable space. For instance, the Simpson molds for concrete porch columns have reached a number that turns out about two hundred styles of block, no two alike. At last year's shows, a full car load of block, weighing about twenty tons, was shipped from Columbus to be used in the Simpson Cement Mold Co.'s display.

Since then, the company's designer has been busy and a considerable number of new designs have been

About 200 full sized blocks will also be displayed, each one individual in design. The attractiveness of the small model blocks is shown in the illustration.

The small blocks shown at the exhibits will be on sale at a miniature price, the idea being that columns built up of them will form attractive decorations for the offices of the plants using Simpson molds.

New Portable Batch Mixer.

The Blystone batch mixer has been on the market for several years, but up to this season was manufactured in one type only, suitable for use in stationary plants. The Blystone Machinery Co., 50

Stop That Leak

With

"Anti-Hydro"

"Anti-Hydro" is the only positive and permanent water-proofing material in the market. It is a liquid which makes cement water, dust and acid proof. It will overcome the most difficult waterproof engineering problems, and has never failed to produce an absolutely tight surface. Because of its acid-proof qualities, it is especially adapted for use on floors in laboratories, factories, etc., where acids are freely handled.

L. J. Buckley & Co.

General Sales Agents,

256 Broadway, New York City, N. Y.



AN EDWARDS INTERLOCKING METAL SPANISH TILE ROOF

WILL OUTLAST YOUR BUILDING

Artistic and Ornamental in appearance and is positively guaranteed to be Fire, Lightning, Rain, Storm and Wind proof.

Its extreme lightness (about one-eighth that of slate), durability and moderate cost commend it to those wishing something out of the ordinary in roofing.

Manufactured from best quality Worcester Grade Terne Plate, furnished painted or galvanized (galvanized after formation) size 10 x 14 inches.

The Edwards Manufacturing Co.

"THE SHEET METAL FOLKS"

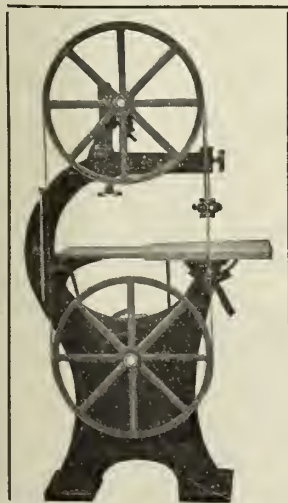
404-444 Eggleston Ave., CINCINNATI, OHIO

The World's Largest Manufacturers of Metal Roofing, Metal Shingles, Metal Ceilings, Etc.

Send for New Free Roofing Book showing our complete line of Metal Roofing, Siding, etc.

This Crescent Band Saw Makes \$1,000 a Year For One Concrete Block Man.

In the O. C. Barber concrete products factory, Barberton, O., a shop is maintained for making special wood patterns. A Crescent Band Saw was installed a year ago. Since then the pattern shop force has been cut down by one man and more and better work is being turned out. That means \$1,000 a year added to the profits.



Saves One Man's Services

Whether you operate a concrete plant or do general construction work, you need wood-working machinery. It cuts your labor cost and produces better work. We have pattern-shop equipment and combination saw tables that may be moved from job to job. Get our catalog and see if you can't cut down your force by doing some of your own woodwork at a reasonable figure.

The Crescent Machine Co.

11 Columbia St.,
Leetonia, Ohio.

Ottawa Silica Company

Ottawa, Illinois

Largest Miners and Shippers of White Sand in the United States

Washed and Steam-Dried

White Sand

Unexcelled for

Facing Concrete Blocks, Ornamental Concrete Stone, White Plaster, Exterior Plastering, Roofing, Sawing Stone, Marble, etc.

You can order less than a carload, in fact shipments as small as five 175 lb. bags can be delivered economically

Analysis 99.90 Pur Silica

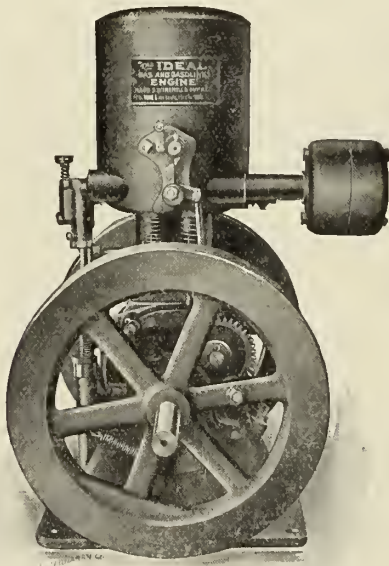
Prices, Freight Rates and Samples on Application

Venango St., Cambridge Springs, Pa., announces that it has built a number of mixers mounted on hand trucks without power and others on large trucks with power attached and will in the future supply machines to contractors who want a batch mixer for outside work.

The new type of Blystone mixer eliminates all loading and discharging devices, just as the block plant type machine did. It is equipped with a 2 H. P., I. H. C. gasoline engine, Bickerstaff positive friction clutch, cut gears and staggered spoke steel truck wheels.

"Ideal" Gasoline Engines for Concrete Men.

Dependability, simplicity, low first cost and small maintenance charges—these are the points emphasized by the Ideal Gas Engine Co., Lansing, Mich., in talking about the "Ideal" gasoline engine. The



Ideal Gasoline Engine—Mixer Type

rapid development of the automobile and motor boat industry has resulted in striking advances in gasoline motor manufacture and the only objection that ever was urged against the gas engine—its occasional fits of idleness—has ceased to be valid.

The "Ideal" engine has been built with the idea of eliminating unnecessary parts and reducing the necessary parts to their simplest forms. Given a mixture of gasoline and air in a confined chamber and a live spark to ignite it, the expansion resulting from the explosion is strong enough and rapid enough to do work. The pump on these engines,

which supplies the gasoline, is a one-piece casting, in which check valves are replaced by two bronze balls, the simplest known type of gasoline supply control. A throttle in the carburetor, which is properly located near the combustion chamber, provides for rapid and accurate determination of the mixture of air and gasoline. The "make and break" method of ignition is used, as producing a sure and a hot spark.

Engines are constructed on the four-cycle system, for the production of a continuous stream of power by repeated impulses. The governor makes use of centrifugal force acting upon a weight actuating a brake bearing on the hub of the fly-wheel, and a device for changing the speed of the engine while it is running, by turning a thumb-screw, is included in the outfit. The engines are made in two types, open jacket and "Type A," and range in horsepower from 1½ to 9, the manufacturer guaranteeing that they will develop 10 per cent better than their rated horsepower.

Sidewalks Laid in One Coat.

Contractors in the East report the successful construction of concrete sidewalks and floors which were laid in one coat only. It is said that the labor cost of the job is materially reduced while the quality of the work is improved rather than impaired.

The original idea of two-coat work grew out of the theory that a specially hard wearing surface for a concrete walk or floor must be put on by laying a coat of rich concrete mixture on the coarser concrete of the base and endeavoring to secure a bond between the two coats. Much sidewalk and floor work is now laid in one coat. The concrete contains a good percentage of coarse aggregate and is laid wet. Then with some special tool the coarse aggregates are forced away from the surface, letting the richer cement mortar flow into place to form the wearing surface.

For several years contractors who erect monolithic concrete buildings have been finishing their walls in this manner, by running a special spade down inside the outer form, pressing the coarse aggregates back and letting the sand-cement mortar flow to the surface. The same theory applied to horizontal concrete surfaces is said to work equally well. Our attention was most recently called to it by the Harold L. Bond Co., 383 Atlantic Av., Boston, Mass. This company has conducted many experiments along this line and manufactures the An-

(Continued on page 82)

SAMSON SPOT SASH CORD



Made of extra quality stock, carefully inspected, and guaranteed free from all imperfections of braid or finish. Proved by both tests and long experience to outwear common cord or metallic devices many times over. Can be distinguished at a glance by our trademark, the Spots on the Cord. Send for catalogue and samples.

Trade Mark Reg. U. S. Pat. Off.

Samson Cordage Works, Boston, Mass.

The Block:

Ideal panel blocks, $\frac{1}{4}$ " bevel, $\frac{1}{4}$ " margin, were used in this house. Builder Frank E. Clark writes:
"I made \$35,000 worth of Ideal blocks and trim this summer."



The House:

Ideal block residence of Frank E. Clark, Bridgeport, Conn.—homelike and substantial, no repairs, no painting, no up-keep.

The Machine:

This IDEAL Block machine unit is a complete plant concentrated in a space 8 ft. square

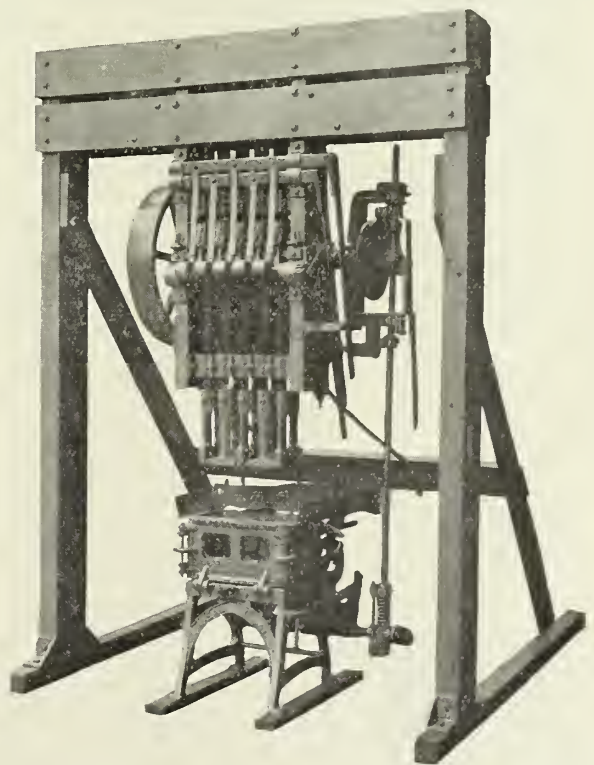
Blocks like the one shown, that build houses like Mr. Clark's, command a good price everywhere—there isn't a city or village in this country in which some enterprising man, with Ideal equipment, can't establish a healthy business that will make money for him as it grows.

The Ideal Block Machine is the fastest, most reliable block machine on the market. It was designed with the future in mind. As you add one unit to another you cut the labor cost of your product and you improve the quality.

**You can add one part at a time
to your equipment**

The Scraper and Finisher attachment saves time and hand work. The Automatic Tamping increases output—tamps a firm, dense, solid block. The new Core Actuator makes the whole outfit automatic—the assembled machine does all the work, with one man needed to pull two levers.

Before you buy another piece of machinery for your block plant, investigate the Ideal line. Use the coupon below.



Ideal Concrete Machinery Company

London, Ontario, Canada
Chicago Office—1075 Old Colony Building
New York Office—1958 Hudson Terminal Building

403 Emerick Street, South Bend, Ind.

Architects are referred to Sweet's Index, pages 28 and 29.

Ideal Life Guarantee

The Ideal Concrete Machinery Company guarantees all Ideal Concrete Machines free from defects, in material or workmanship, and will replace, free of charge, any defective material when returned to its factory for inspection, transportation, prepaid. This guarantee covers and protects original purchasers only.

Dept. 403

Tear off coupon and mail today

Please send me your catalog No. 12. I have checked items in the following list that are of special interest to me and ask that you send me particulars on same.

Block Machines
Brick Machines
Veneer Block Machines
Dimension Stone Machines
Step and Sill Moulds

Sewer Pipe
Drain Tile
Fence Posts
Silo Blocks
Ornamental Molds

Automatic Power Tampers
Scrapping and Finishing Attachments
Batch Mixers
Continuous Proportioning Mixers
Tycrete Compound and Colors

Name..... Town.....

State..... R. F. D. or Street No.....

In writing Advertisers please mention CONCRETE.

(Continued from page 80)

draws concrete tamper, which is one of the various tools used by contractors who lay their sidewalks in the new way. The Bond company has introduced the method to hundreds of concrete men, who claim that they are now able to produce better work at a lower cost than they did formerly.

Manufactured Stone Turned Out by Hydraulic Press.

A type of machine used more and more in the production of artificial stone is the Jaeger-Keny hydraulic concrete stone machine, which is marketed by the Jaeger Machine Co., Columbus, Ohio. It is described as filling a long-felt want, in that it manufactures stone of wet concrete and does it at high speed and low cost. Users of the apparatus report to the manufacturers that they have been able to reach and interest architects, contractors and builders that had never given them any business before, basing their bid for business on the merit of their product and the price at which it could be sold.

Tests of a piece of dimension stone, turned out on one of these presses, recently demonstrated the high resistance to crushing strength offered by properly made concrete. The stone, from the yards of the Cunard-Lang Concrete Co., Columbus, Ohio, was tested by the Ohio State University and resisted the capacity of the testing machine, 3,400 lbs. to the square inch, without crushing.

The manufacturers are utilizing a somewhat unique plan of marketing their apparatus. Machines are leased to operators in different localities, the operator paying for the use of the machine as he turns out products from it. The manufacturers state that the machine is being installed in the most up-to-date concrete products plants in the country.

Mixer That Handled Tar on Street Paving Work.

As an example of the versatility of modern concrete mixers, the experience of P. & P. Jannarone, contractors, Belleville, N. J., with an "Eclipse" low-charging apparatus, is of interest. They had the job of treating a road in Rutherford, N. Y., with Tarvia. Tar was melted in the usual way and poured into the mixer drum from the low charging platform shown in the illustration. In the drum it was thoroughly mixed with crushed stone and discharged into wheelbarrows for use in the top dressing. The contractors report that the machine ran clear and worked rapidly, without clogging or other trouble

from the tar. In order to keep the tar from chilling, a small fire-box, about 24" square and 12" deep, was kept under the mixer drum and a small wood fire was maintained. This simple arrangement answered all purposes and the finished work had the approval of the city engineer.

Messrs. Jannarone are using the same mixer now on other and different classes of street paving work. They state that it is very flexible and a splendid type of mixer for the general contractor to have in his equipment.

The Standard Scale & Supply Co., manufacturer of the "Eclipse," has received a number of reports from satisfied contractors, detailing their experience with the mixer in preparing mortar for brick laying, rough coat plaster and so on. The firm has recently closed some large and desirable contracts for mixers to be used in bridge building and other classes of construction.

New Type of Monolithic Forms.

In the development of the Polk system of monolithic concrete forms, the designers kept in mind the idea that the forms should be handled independent of the structure being built. In other words, they built their equipment to take care of itself—the forms may be released from the green concrete walls and may be raised or taken away without disturbing the structure.

Curved forms for erecting circular structures, such as silos, were placed upon the market first. These forms will be described in detail in a later number of CONCRETE. They are put in place and removed by a system of levers operated from a perpendicular mast in the center of the structure. Contractors who have used these forms assert that they are easily operated and produce good concrete construction. The Polk, Genung, Polk Co., Ft. Branch, Ind., manufactures and sells the equipment which will be shown at the Chicago Cement Show.

Oil Engine for Contractors.

A two-cycle engine, running on kerosene and fuel oils, which are ignited by a hot surface, has just been put on the market by the Blanchard Machine Co., Cambridge, Mass. Wolcott Remington, well known as a successful designer of oil engines, is responsible for this one, and he has undertaken to turn out a low cost and low maintenance apparatus, which ought to be very adaptable for contractors'

(Continued on page 84)

"STONEKOTE"—STUCCO READY TO USE

This prepared Portland Cement Stucco comes in 67 shades of White, Gray, Silver Gray, Buff, Red, Brown. This product will solve your stucco difficulties. Sample Free. We also sell Keene's Cement, Fire Brick for Kilns, R. I. W. Waterproof Paints, Hard Wall Plasters, and general building materials.

GARDEN CITY SAND COMPANY,
909 Ch. of Com. Bldg., CHICAGO, ILL.

BOOK ON "HOW TO APPLY ROUGH-CAST"

This book tells how to apply Cement Stucco to get different finishes. Copy sent free on request.





The Simple, Little, Light, Handy and Substantial

NORTHFIELD MIXER

Will Save You Big Money on Every Job.

Conservative Capacity: 90 cu. yds. per day. It can always be set to discharge direct into forms, cutting out $\frac{1}{4}$ the wheelers. It saves you $\frac{3}{4}$ the transportation charges and all repair bills, as compared with any other mixer.

No man's business is so big, nor no job so small but what it will pay to have this little Money, Time and Worry Saver on the Work.

New Principle

Plows, Hoes, Stirs, Mixes Mortar, Plaster or Concrete. Insures a thorough mixture under all conditions. The only satisfactory color blending machine.

Is Not a Man-killer

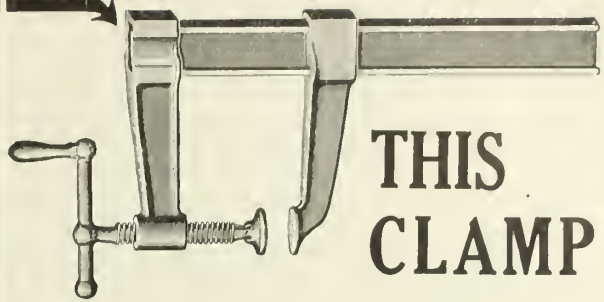
Operates by either Engine, Motor or Hand Power. Most Reasonable Priced Good Mixer on the Market. Sold on Trial—Satisfaction Guaranteed.

Write at once for FREE Catalogue, Prices and Terms.

MANUFACTURED BY

NORTHFIELD IRON COMPANY

406 Water Street, - - - NORTHFIELD, MINN.



THIS CLAMP

is the handiest, cheapest, most satisfactory device for holding concrete centering in place. It is instantly adjusted, holds the forms rigidly and is easily released. A turn of the screw arm does it. These clamps are just as handy in manipulating wood molds in your shop as they are on the construction job. They are far better than nails or wires.

All Kinds of Clamps

We handle all kinds of wood and metal clamps for concrete contractors, carpenters, cabinet makers, etc. Our catalog illustrates all styles. It is an interesting booklet to have. A copy will be sent free on request.

Ask for
Catalog
No. 2927

Hammacher, Schlemmer
& Co.

4th Ave. & 13th St.

New York, Since 1848



We Will Exhibit at All Three of The Big Shows

NEW YORK - CHICAGO - KANSAS CITY

The variety of our designs has now become so great that it is no longer practicable to ship and exhibit anything like a complete line of Simpson Concrete Porch Columns. We have therefore spent some months in making molds for **MINIATURE CONCRETE MODELS OF COLUMN BLOCKS**, and we will show in our booths about thirty beautiful little columns, exact copies of the full size ones. The engraving gives an idea of them, and more of them appear on another page of this issue of "Concrete." We will also show a big lot of the large blocks—**NEARLY 200, AND SCARCELY TWO ALIKE.**

We have been at all the National Cement Shows ever since they began at Milwaukee six years ago. Our displays of porch trimmings, and other ornamental concrete work, have always been an important feature of these great shows and tremendous crowds of people have inspected our exhibits with intense interest.

It is a noteworthy fact that of all the large number of exhibitors of all classes at the National Shows of five or six years ago only a few remain in business today. It shows with absolute cer-

tainty that in the concrete field, where so many men are busy every day developing new ideas, only those articles of the highest merit are able to stand the fierce test of time.

SIMPSON MOLDS

began to make good at the very beginning and sales have steadily and constantly increased ever since. The molds have gained a high reputation which is worth so much to us in dollars and cents—in hard cash—that we could not possibly afford to do anything to injure it. For

instance, we could not afford to allow the molds to lose anything of the accuracy and perfection of interior finish which has been the admiration of every man who ever used them. Nor could we afford to stand still in the matter of new designs and improvements. We could not afford to make representations which the molds do not fulfill in every respect. In short, we could not afford to risk losing a good business which it has taken years to build up. Our guarantee is ironclad, and you can absolutely depend upon it.

OUR NEW CATALOGUE GOES INTO FULL DETAILS CONCERNING THE MOLDS AND THE WORK DONE IN THEM AND CONTAINS MORE THAN 100 HALF-TONE ENGRAVINGS FROM INTERESTING PHOTOGRAPHS. IT IS WELL WORTH YOUR ATTENTION, AND YOU CAN HAVE IT UPON REQUEST.

The Simpson Cement Mold Co. 101 Vine Street
COLUMBUS, OHIO



(Continued from page 82)

use. About twice the compression obtainable on the ordinary oil engine is claimed for this type, with a fuel consumption of not more than 1/10 gallon per brake horse power per hour.

In operation, the piston's up-stroke uncovers a port admitting air to the closed crank-case. On the down-stroke, this air is slightly compressed and then transferred through ports to the cylinder above the piston. The next up-stroke compresses it and just before the compression is completed fuel is atomized into the cylinder by a pump. The finely atomized oil is made gaseous by the heat of compression and ignited by coming in contact with a hot plug, located in the cylinder head. Heat is supplied to this by the burning fuel. The Blanchard engine is made in eight sizes, developing from 8 to 100 horse power, with one to four cylinders.

Cost Figures on Crushed Granite for Facing.

In the November issue were published some cost figures on the prices of facing materials. We are advised by the Monarch Mining Co., 120 Culver Avenue, Jersey City, N. J., that its prices on crushed granite in less than ton lots are 40c per cwt.; less than car lots, in bags, \$6.00 per ton; car lots, in bags, \$4.75 per ton; car lots, in bulk, \$3.50 per ton.

White Portland Cement is Widely Used.

Announcement is made by the Sandusky Portland Cement Co., Sandusky, Ohio, of two noteworthy shipments of American-made white Portland cement—the "Medusa" brand. One order of five cars has lately been shipped to Sydney, Australia, and one of two cars to Delagoa Bay, South Africa. Coming closer to home, several thousand barrels will be used on the Woolworth building in New York City, the highest office building in the world. The large foreign shipments are the more remarkable for the reason that "Medusa" white Portland cement has been on the market for a few years only.

One way to a man's attention is through his "funny bone," and this way is chosen by the Carborundum Company, of Niagara Falls, New York, in the Revised American Statesmen series of booklets. Of course, concrete workers know this company because of carborundum rubbing bricks and other things, but the booklet has very little to say about the bricks. The vest pocket volume is devoted to a history of the life of Captain John Smith, told with much humor by

F. W. Haskell. The company will send copies of the life of the captain on request.

New Machinery Company in Arrowsmith, Ill.

The Concrete Supply Co. has been organized in Arrowsmith, Ill., by R. L. Sohn, H. J. Thompson, Walter A. Scott and H. M. Scott. The company will manufacture a complete line of concrete workers' and masons' tools and supplies, as well as a line of concrete mixers, block and brick machines, metal sidewalk forms, etc.

It has already placed upon the market a new line of long-handled finishing tools. The long-handled



New Long-Handled Edger

edger is shown here. The method of attaching the long handle to the tool proper is one of its principal features. The handle is easily and quickly connected and disconnected.

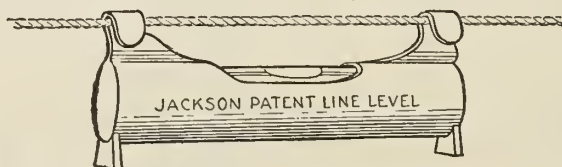
New Ideal Machinery.

An automatic core actuator has been perfected and placed on the market by the Ideal Concrete Machinery Co., South Bend, Ind., the apparatus forming the completing link in the chain of automatic block-making equipment turned out by that company. The actuator provides for the insertion and withdrawal of the desired cores upon one motion of a level in the hands of the machine operator.

At the present time, the Ideal company has on the market automatic devices for mixing and proportion-

(Continued on page 86)

THE JACKSON ALUMINUM LINE LEVEL



Does the work of a sixteen-foot straight-edge. May be used on a line or attached to the ordinary steel square or pocket rule. No mechanic should be without one. Useful to masons, bricklayers, concrete block layers, carpenters, contractors, architects, plasterers and engineers. Circular describing this level sent on request.

Joseph Woodwell Co., 201 WOOD ST
PITTSBURG, PA.
Send for catalogue of Bricklayers', Masons' and Cement Workers' tools.

Price

\$100

Post Paid

Our machines HAVE to make good or you don't have to pay for them---Try them before you buy them

W. E. Dunn Mfg. Co.

4134 Fillmore St.

Chicago, Ill.

Face-Down Block Machine

Make your blocks face-down or side-face on this machine. Make two-piece wall blocks on the same machine. Simple, easy to operate, nothing to get out of order.

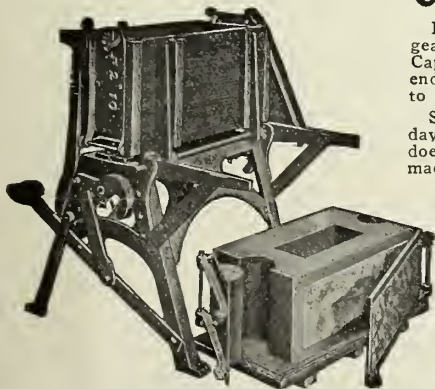
The W. E. Dunn block machine is the result of years of experiment. We have eliminated a great deal. We've brought this machine down to the simplest possible form, and still have a reliable block-making equipment.

This block machine will save money for you when you buy it and will make money for you ever afterwards.

You can set it up in your plant and make blocks on it for two weeks before you finally buy it. Write for catalog. Shows this machine in detail and the list of plates and accessories that go with it.

Shipped on 15 Days Trial

Price \$40.00



Pier and Column Molds

Our line of ornamental molds for concrete work is unrivaled. The ornamental line is a good line to get into. It pays. There's a growing market for ornamental concrete work.

Our big machinery catalog lists many different molds and sets of molds in this line. You can buy one mold or a set—add to your equipment as you need new designs. We show here just one of the bargains listed in the catalog.

Don't buy any ornamental mold without first seeing it and trying it out. It doesn't pay.

Order any mold you want from our line and give it a thorough test before you accept it. That's our way.

One Set of these molds will make 21 different sizes.

Price \$25.00



Cement Drain Tile Machine

Built on a new principle. Solid base, enclosing all gears, shafts and bearings. Moving parts run in oil. Capacity, 2,000 tile per day. Tile packed hard at the ends. No culls. Machine is easily moved from place to place.

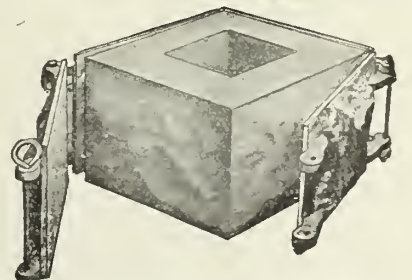
Set this machine up in your plant and run it 15 days before you buy it. Let your boy run it. If it doesn't make good, ship it back. Ask for special tile machine circular.

Price \$175.00

Visit us and see machines operating at the Cement Shows.

Chicago, Booth 128

Kansas City, Booth 38



Concrete Sewer Pipe Poured Wet

Dunn Sewer Pipe Mold. Molds 12-inch pipe, wet or dry process. No tamping necessary. New core form. Outer casing locks tightly. Shipped on 15 days' free trial.

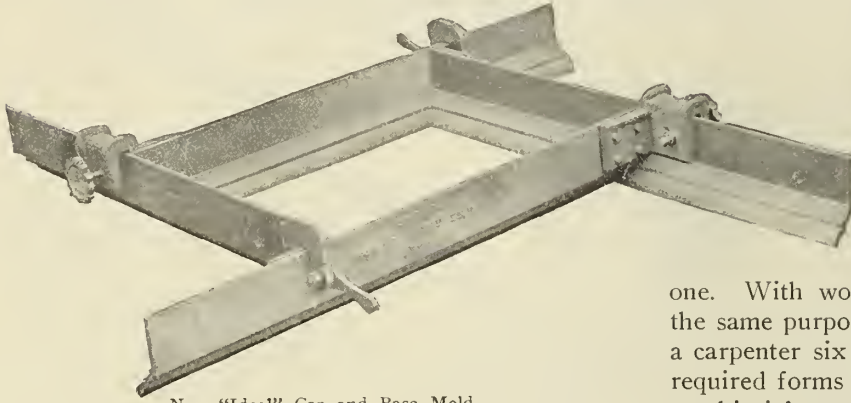
Price \$7.50

Try Them—
Before You Buy Them—

(Continued from page 84)

ing materials, conveying and discharging them into the machine, tamping, striking and finishing the block, and inserting and withdrawing the cores. Automatic equipment, of course, makes for speed, uniformity and low cost.

Additions to the "Ideal" line are coming thick and fast. The company's list of ornamental molds has just



New "Ideal" Cap and Base Mold

been increased by two balustrade molds, one 15" high and 5" square, top and base, and the other 20" high and 8" square, top and base. The former is designed for light porch work and the latter for bridges and heavier buildings. An adjustable cap and base mold is also announced, providing for the manufacture of caps and bases in any size up to 3' square and 16" high or thick. Still another new one is a plain side-face circle or silo block mold, for forming block 8" high, 10" wide and 16" long, for silos with a 9' radius. Block are formed with a horizontal groove provided for reinforcement.

The Universal Concrete Machinery Co., formerly of Waterloo, Iowa, has consolidated with the Iowa Foundry and Mfg. Co., Fort Dodge, and will operate and transact business under the name and charter of the Iowa Foundry and Manufacturing Co., Fort Dodge, Iowa. It will manufacture a general line of concrete machinery and gasoline engines.

New Method of Centering the Device of a Pennsylvanian.

Henry H. Frick, Fricks, Pa., has invented a new system of adjustable steel centering the use of which appears from his report to result in a considerable saving over old methods. Mr. Frick advises that the sys-

tem can be adjusted to the smallest size of center required for culverts under walks or driveways, or can be used for the largest bridge that can be designed.

It is adapted, says the inventor, to supporting either curved work, like sewers and culverts, or flat work like the walls of houses, faces of dams, breastworks and so on. Owing to its adaptability, it can be used as forms of all shapes of pillars, round, square, oval or polygonal.

As an instance of the saving effected in labor cost with the use of his system, Mr. Frick details the relative costs in a bridge with an arch 20' wide, 6' high and 28' in length. He used five centers in this construction, and required only an hour's work on each one. With wood centers of the same size and for the same purpose, he figures that it would have taken a carpenter six days of eight hours each to make the required forms and erect them. The only lumber used on this job consisted of a small prop in the center of a few feet of lumber, which was left fit for use again when the job was completed. In the manufacture of one wood center such as would have been required for a job such as the construction of the bridge mentioned there would have been needed, according to Mr. Frick's figures, 160 feet of lumber.

Headquarters of the Corrugated Bar Co., formerly at St. Louis, Mo., were moved October 14 to Mutual Life Bldg., Buffalo, N. Y., where the company should now be addressed. A district sales office will be maintained at St. Louis, and the district offices at Chicago and New York will be continued, to handle the company's increasing business. CONCRETE wishes the company all prosperity under the new arrangement.

Androck Wall Ties.

Wood centering for concrete has a great many advocates and manufacturers of contractors' equipment are rapidly overcoming the main difficulties attending the use of wood forms. The man who cuts and nails his lumber is of course making a hole in his profits but there are so many excellent methods for fixing wood forms in place that this is a useless waste.

The Andrews Wire and Iron Works, Rockford, Ill.

(Continued on page 88)

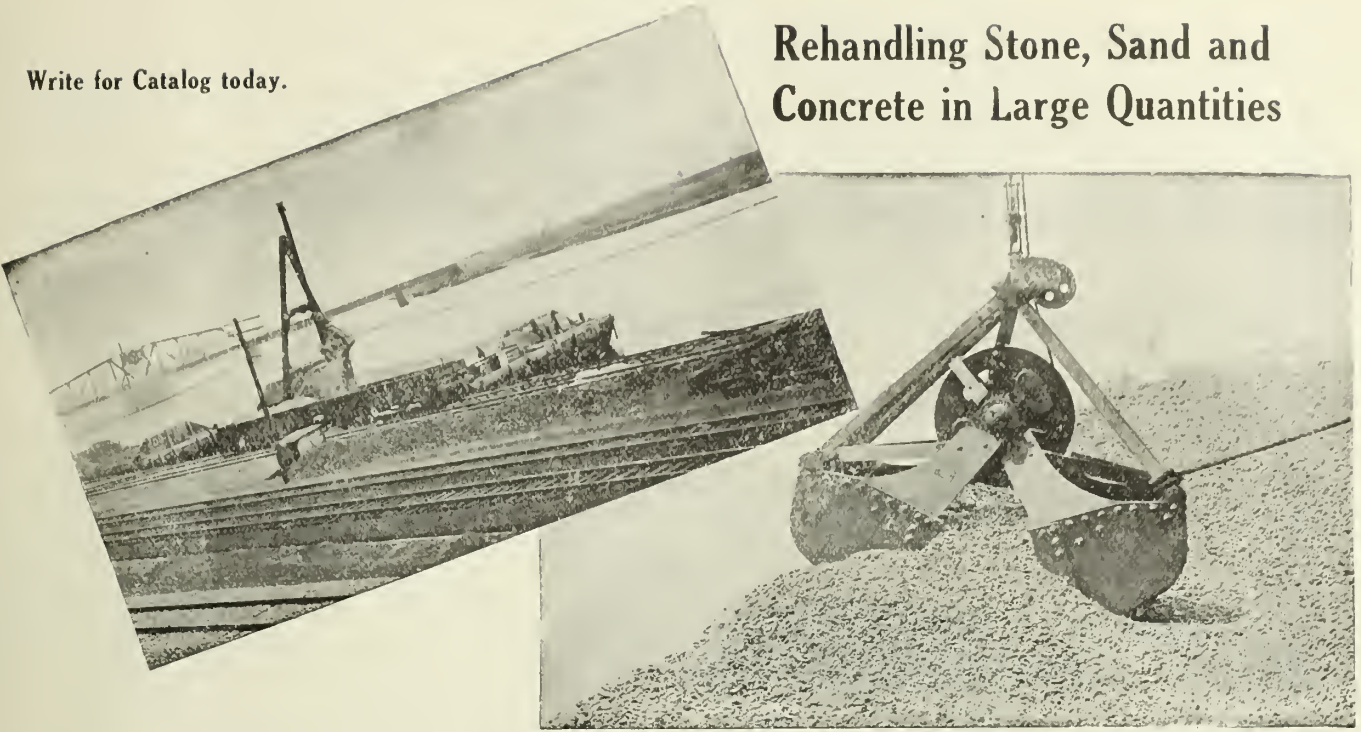
STRONG COLORS FOR CEMENT

Red, Black, Buff, Green, Blue, etc.

C. J. OSBORN COMPANY 268 Water St.
New York, U.S.A.

Write for Catalog today.

Rehandling Stone, Sand and Concrete in Large Quantities



Hayward Clam Shell Buckets FOR CONCRETE WORK

Economy and Rapidity in Concrete Work Are Both Obtained by the Use of Hayward Clam Shell Buckets.

On a dam built in the Monongahela River, a HAYWARD CLAM SHELL BUCKET was used to rehandle the sand and gravel, making it possible to mix 250 cu. yds. of concrete per 8 hr. day, one man only being needed to do this work. The storage bins were so arranged as to allow the operator to see into them, from his post, enabling him to dump his loads without mixing or wasting. Besides the rapidity of rehandling about 375 cu. yds. of material, the labor cost per unit was extremely low.

Plant and Equipment become a small item if the best machinery is installed. On the Pittsburg Filtration Works, at Aspinwall, Pa., Hayward Clam Shell Buckets were used to rehandle all the materials for the concrete. The aggregate and sand were unloaded from scows by Hayward Clam Shell Buckets. The volume of material handled was enormous. When concrete mixers discharge into hoppers, which allow the mixer to work continuously, Hayward Clam Shell Buckets can be used to rehandle the concrete. If sand and gravel have to be excavated for concrete, this, too, can be done with Hayward Buckets.

Hayward Buckets, being of superior manufacture and mechanism, operate in a positive manner. They are quick acting, and stand up under the work both for digging and rehandling materials.

The Hayward Company, 50 Church Street, NEW YORK

TAKE OUR WORD FOR IT

THE MOST PERFECT BARROW FOR HANDLING LIQUID CONCRETE, SAND, GRAVEL AND BROKEN STONE

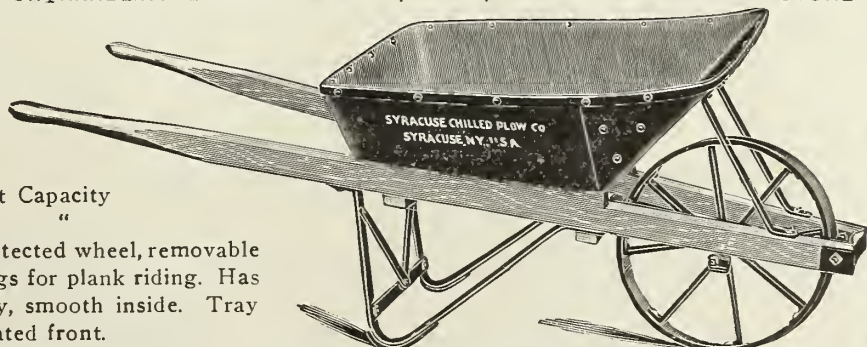
**ORDER A TRIAL LOT
ON OUR SAY SO**

After that you will never be in doubt
as to what Barrow to buy

No. 75-A 3½ Cubic Feet Capacity
No. 79-A 4 " " "

Is an end dumping Barrow, has protected wheel, removable shoes on legs, cross bar between legs for plank riding. Has an extra strong strapped steel tray, smooth inside. Tray placed well forward and with elevated front.

SYRACUSE CHILLED PLOW COMPANY, SYRACUSE, N. Y.



In writing Advertisers please mention CONCRETE.

(Continued from page 86)

makes a welded wire tie which is slipped over the upright timbers that hold the boards in place. The ties are simply No. 9 wire loops, electrically welded, made in various sizes for different wall thicknesses. They cost very little and are so strongly made as to be practically indestructible. By their use it is unnecessary to cut the timber or to drive nails, thus saving an additional amount on the centering itself.

Dump-Bucket for Placing Concrete in Thin Walls.

In working on comparatively thin concrete walls, contractors have found more or less difficulty in using the ordinary type of drop-bottom bucket, since most of those on the market have uniformly sloping sides, or



New Ransome Dump Bucket

the dumping mechanism is on the front or discharge side, where its operation is interfered with by reinforcing rods or the forms on the walls. To overcome this difficulty a drop-bottom bucket has been devised, the section of which is a right-angle triangle, with the front or discharge side vertical. The drop bottom,

which is slightly curved, is about $\frac{1}{8}$ of the length of the sloping side. It is operated by a handle, on the end of which is a cam, bearing on an equal arm lever that connects through another lever to the drop bottom. The operator is able to release the concrete in large or in small quantities. Where it is desired to deposit a thin layer only, the operator can move the bucket forward or backward, spreading the mass discharged. With a little experience, an intelligent operator can throw concrete from this type of bucket through a steel system 4' to 6' wide.

This type of bucket is practically self-cleaning. The vertical face gives a clear fall to the batch of concrete, which draws the concrete down with such force that a scouring is produced on the sloping side and the bucket is cleaned. The bucket is patented and is being marketed by the manufacturers, Ransome Concrete Machinery Co., Dunellen, N. J.

"Feralun" in Concrete Construction.

To overcome the slipperiness of concrete under certain conditions, a new material known as "Feralun" is being marketed by the American Abrasive Metals Co., New York City. The product consists of a patented combination of iron or steel and laboratory corundum. Natural corundum, or emery, as it is commonly called, is often far from uniform in quality, owing to the presence of impurities. The laboratory product, manufactured by the Norton company in electric furnaces at Niagara Falls, N. Y., is known by the name, alundum, and is extensively used as an abrasive. In hardness it is next to the diamond.

"Feralun" was first used in 1905 for liner plates in centrifugal sand dredge pumps, where it was found to be four times as long-lived as hard white iron or steel. A slight change in method of manufacture produces a durable anti-slip material for surfacing stair treads, steps, running boards, floors and other surfaces subjected to foot traffic. Its first use was on the flooring of a railway ferry bridge in an important railroad terminal in Jersey City, N. J., where it is still in commission, without appreciable signs of wear. In 1909, the northeast stairway of the Fulton street subway station, New York City, was equipped with feralun treads. The traffic is about 12,000 per day, but after service through two winters the installation is still preventing passengers from slipping. Repeated experiments demonstrate

(Continued on page 90)

Montross Metal Shingles Will Lower Your Insurance Rate

Not only this, they will give your building greater protection against fire, storm, lightning.

Furthermore, they will outwear any wooden or composition roofing made. Will not leak, rattle, crack or blow off. Easy to put on, no soldering.

MONTROSS METAL SHINGLE COMPANY
104 Erie St., Camden, N. J.

MONTROSS METAL SHINGLES



Send for illustrated catalogue, testimonials, prices, etc. Good proposition offered to agents.

Toch Brothers

Inventors

and

Specialists in Technical Paints

Cement
Paints

Cement
Waterproofing
Compounds

Cement
Colors

"Liquid Konkerit"

Patented

A Cement Paint for Walls

"Toxement"

Patented

For Waterproofing Cement

"Tockolith"

Patented

A Cement Paint for Metal

**"Cement Filler and Cement
Floor Paint"**

Patented

"Toxloxpore"

Copyrighted.

Colorless Damp Proofing

"Cement Colors"

First Made and Still Best

60 Different Colors

INVENTORS AND MAKERS OF

"R. I. W." Damp Resisting Paints

"DIFFERENT FROM ALL OTHER PAINTS"

VISIT OUR EXHIBIT AT THE N. Y. CEMENT SHOW
OR WRITE US FOR DETAILED INFORMATION

Toch Brothers

Established 1848

320 Fifth Avenue, New York

Works:

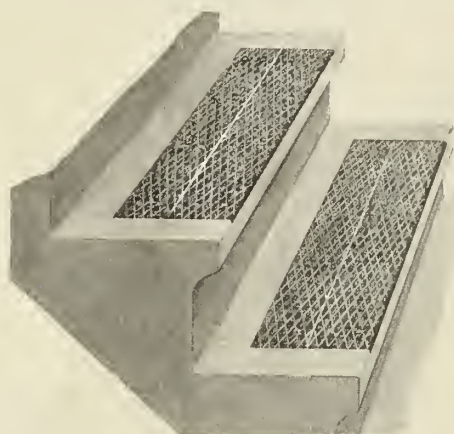
LONG ISLAND CITY, N. Y.

TORONTO, CANADA

In writing Advertisers please mention CONCRETE.

that not even a coating of oil will render these surfaces slippery. Sharp grains of alundum project slightly above the surface of the concrete and give a firm grip for the pedestrian's shoe soles.

In applying the material to stairways, the anti-slip element is incorporated in the rounded nosing



Feralun Treads in Concrete Stairs

as well as in the crown of the tread. This is important, since the edge of the step is the spot upon which a passenger places his foot in descending the stairs.

While treads of this material wear a very long time, they are naturally not everlasting, and some means must be provided for their easy and rapid release and replacement when that finally becomes necessary. The Public Service Commission of New



Feralun T's Used in Giving Anti-slip Surfaces to Sidewalk Vault Lights

between the rows of glass lights. It is, of course, desirable to have these installations wholly waterproof and a new form has recently been devised, consisting of ingeniously molded frames of alundum, which completely surround the lenses. The frames are first dipped in a plastic, waterproof cement, which serves the additional purpose of forming a cushion against the force of expansion of the glass. Drainage channels are provided to carry off the surplus moisture, preventing its accumulation. Feralun works well in conjunction with concrete, because its coefficient of expansion is the same as that of the latter material.

Besides being extremely useful as a preventive of slipping, the material is high in its resistance to high temperatures. Grate bars, linings for fire-doors and baffle-plates of feralun not only resist abrasion to a remarkable degree, but are also practically immune from the action of heat, even when long continued.

Field and business expansion have led the Blaw Callapsible Steel Centering Co., Pittsburg, Pa., to increase its engineering organization; William Mayo Venable, M. A. S. C. E., has joined the staff. Mr. Venable is a well known engineer and author, especially of text-books on sanitary subjects, and as a contributor to technical magazines. He was in charge of the Long Key viaduct on the railroad to Key West, where he was division engineer. Section A of the East Boston tunnel, several sections of the New Orleans drainage system, and four sections of the Louisville sewerage system were constructed under his management. He is also responsible for a number of sewage disposal works and garbage incinerators at army posts throughout the country.

In his new activity, Mr. Venable will devote most of his time to the application of steel forms to building construction, with which he is naturally familiar.



New Waterproofing.

The California Drug & Chemical Co., Inc., Los Angeles, Cal., has been having success in introducing its Imperial brand of waterproofing. The product comes in liquid form and is applied in two ways. In basements and other underground structures a cement mortar is made, using the chemical in place of water in the mixture. This mortar when applied to the walls is said to resist successfully the pressure of ground waters and will not absorb atmospheric moisture.

The waterproofing may be applied with a brush to exterior walls to waterproof them. It does not form a coating over the concrete but preserves the original texture. The addition of pigment is resorted to in order to secure colors. A brush application of the chemical to interior walls is said to dampproof them permanently and allow the direct application of plaster.

York requires that the tread shall be attached to a wood block, of oak, secured by metal anchors to the body of the step. Provision is made for attaching the non-slip protection to the oaken block, by means of screws. Unless traffic is very heavy, this method may be simplified by attaching the feralun directly to the body of the step.

It is figured that the labor cost of placing the treads is balanced by the decreased area of the completed step to be troweled.

For iron stair construction, a feralun anti-slip nosing piece, with concrete or rock asphalt tread in a pan of sheet steel is used. Feralun finds an additional use in connection with concrete vault or sidewalk light construction for the purpose of keeping foot-passengers from slipping. Here it takes the form of buttons which are embedded in the concrete

barrows, carts and cars for the concrete products plant.

1. Our line includes every type of wood, steel and iron cart, barrow and car used for the economical handling of concrete materials and products. Cut down your labor cost, save floor space and increase your output by handling your product easily and cheaply.

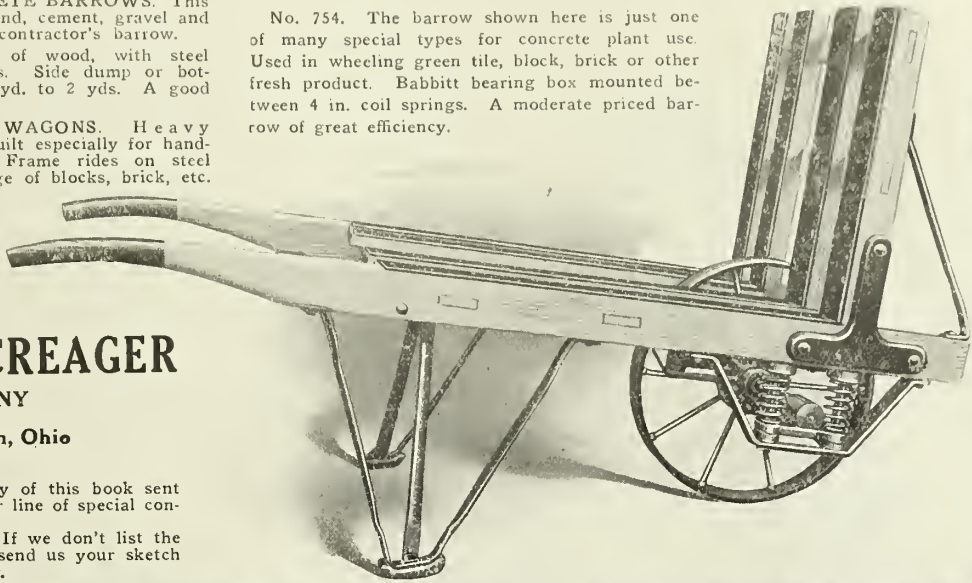
STEEL TRAY CONCRETE BARROWS. This type is widely used for sand, cement, gravel and mixed concrete. A good contractor's barrow.

DUMP CARS. Built of wood, with steel frame. For dry materials. Side dump or bottom dump. Capacity, $\frac{3}{4}$ yd. to 2 yds. A good car at a low price.

CONCRETE BLOCK WAGONS. Heavy frame, wide-tired trucks built especially for handling concrete products. Frame rides on steel springs to prevent breakage of blocks, brick, etc.

SEWER PIPE BARROWS. Ask about our special type of trucks and barrows for sewer pipe and drain tile plants.

No. 754. The barrow shown here is just one of many special types for concrete plant use. Used in wheeling green tile, block, brick or other fresh product. Babbitt bearing box mounted between 4 in. coil springs. A moderate priced barrow of great efficiency.



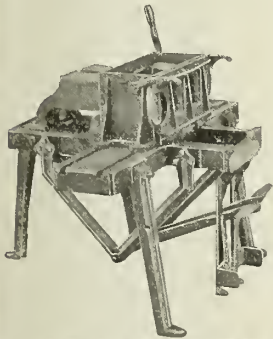
THE
ARNOLD-CREAGER
COMPANY

New London, Ohio

OUR CATALOG. Copy of this book sent on request. Illustrates our line of special concrete plant equipment.

BUILT TO ORDER. If we don't list the car or barrow you want, send us your sketch and we'll build it to order.

THE BEST BUILT BLOCK MACHINE ON THE MARKET



"The World Beater" is fast and positive in operation. Foot levers govern mold box and cores.

Makes solid or cored blocks, water table, porch column, circular and octagon blocks.

Not a lost motion. Every part accurately machined, insuring easy operation and true blocks.

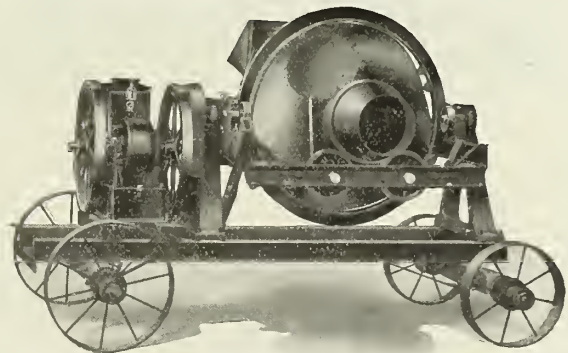
Pallets cast with handles—no carrier needed.

Write for complete catalog.

U.S. GAS MACHINE CO.

Muskegon, Mich.

Men pooh, pooh, sometimes, at "Book Learning." A man's own experience certainly is the best teacher. But a man's own experience doesn't contain enough to be all-sufficient. He must know what experience other men have had. The knowledge of other men's experiences is to be found in books. Practically every book of value to the concrete worker is listed in a catalog which will be sent to you by the **CONCRETE PUBLISHING COMPANY**, 97 Fort Street West, Detroit, Michigan, merely for the asking.



This Polygon Junior Mixer

Is just the right size for the contractor putting in Sidewalks, Foundations, Floors, Retaining Walls, Culverts, Small Bridges, etc.

Light and portable—weighs 2650 lbs.—holds six cubic feet.

Will mix concrete for less than one cent per cubic yard.

It's reasonable in price.

Waterloo Cement Machinery Corp'n.

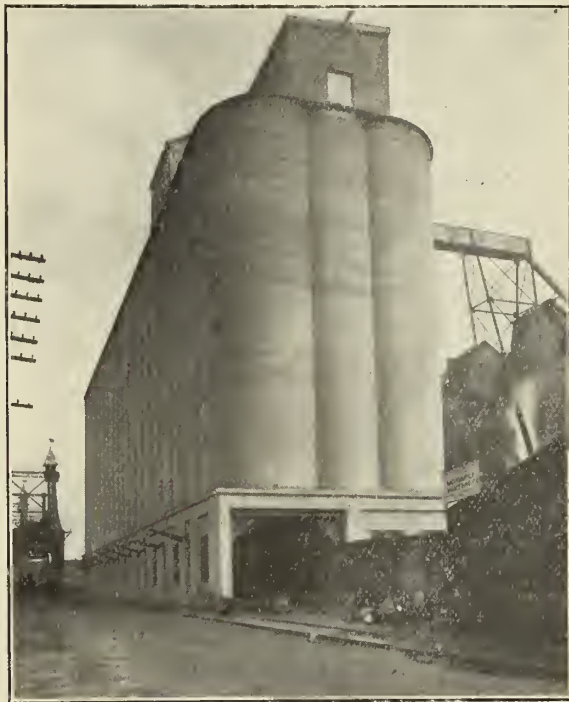
Waterloo, Ia.

Manufacturers of the Great Polygon Line of Mixers, Contractors' Hoists, Derricks, Material Elevators, Etc.

DAMP-PROOFING A FIFTY-SEVEN-CYLINDER ELEVATOR OF CONCRETE.

Even in these days of high powered automobiles, a fifty-seven cylinder elevator is a thing to attract attention. Cylinders in elevators and cylinders in autos are pretty important things these days. A giant container for the storage and handling of flaxseed was recently erected at Buffalo, N. Y., for Spencer Kellogg & Sons, very large dealers in this and other products.

The matter of damp-proofing was naturally of the highest importance, owing to the character of the



Concrete Elevators in Buffalo

material to be stored in the elevators. Decision was finally made by the firm to use Cementkote,* after an examination of several types of waterproofing. One coat was put on last September, under a five-year guarantee by the manufacturers, with the understanding that another coat would be applied early in the spring of 1912. The application was made with ordinary brushes, the material being about the consistency of house paint. Seventeen hundred gallons of waterproofing were required for one coat, and the whole coating was carefully worked out under the brush and well rubbed into the pores of the concrete surface.

Up to the present time, the owners of the elevator report perfectly satisfactory conditions as regards absence of dampness.

*Tropical Oil Co., Cleveland, Ohio.

Catalogs for Handy Reference.

Silos without forms are described in the most recent catalog of the North Western Expanded Metal Co., Old Colony Bldg., Chicago, Ill. The use of "Kno-Burn" and Portland cement concrete is described and there are some useful illustrations.

Asphalt floors are illustrated and described in the catalog issued by the Standard Asphalt & Rubber Co., 137 So. La Salle St., Chicago, Ill. A description of the materials used in making the product of the company is given and specifications for "Sarco" floors are printed.

How to apply plaster by machinery for various types of concrete stucco work is described in a folder issued by the Automatic Stucco Machine Co., Port Chester, N. Y. The wet stucco is scooped out of a container by steel fingers and thrown against the wall by turning a crank.

Levels for architects and builders are listed and described in a catalog issued by Keuffel & Esser Co., New York City.

A number of important buildings, all over the world, are illustrated in a recent pamphlet issued by the Ceresit Waterproofing Co., 129 So. Clark St., Chicago. All of them were waterproofed with "Ceresit" and a long list of important jobs on which the material was successfully used is added to the convincing illustrations.

Riehle Bros. Testing Machine Co., 1424 No. Ninth St., Philadelphia, Pa., has issued a new catalog "K," dealing with testing machines for determining the quality of material designed for good roads. These are the types used by the United States Department of Public Roads, and they are full of interest. A full line of sieves, impact machines, abrasion machines and apparatus for grinding is listed and described.

The concrete roofing tile business from its inception in Europe to its present status in America is reviewed in a comprehensive catalog issued by L. Hansen & Co., 2036 Penn Street, Kansas City, Mo., manufacturers of the "United States Champion" roofing tile machine.

Metal forms for concrete sidewalks, curbs and gutters are described in a bulletin issued by the Blaw Collapsible Steel Centering Co., Pittsburgh, Pa.

Eighty pages of information about roofs are contained in a generously illustrated book issued by the N. & G. Taylor Co., Philadelphia, Pa., manufacturers of roofing tin and tin roofing units.

Many reinforced concrete sewers are described and illustrated by the Lock Joint Pipe Co., 165 Broadway, New York City, in a new booklet issued last month. This contains much information of value to engineers and municipal officials.

"Crown" pneumatic hammers and other air tools of a type used in treating concrete surfaces are the subject of a special folder sent out by the Ingersoll-Rand Co., 11 Broadway, New York City.

The standard requirements for asphalt and asphalt products, with examples of different uses, occupy several very interesting pages in a booklet being mailed out by the American Asphaltum & Rubber Co., 609-614 Harvester Bldg., Chicago, Ill.

Bids for Concrete Paving.

Sealed proposals will be received at the Office of the Clerk of the Village of Howell, Michigan, until January 30th, 1912, at seven o'clock p. m., for paving, with concrete, that portion of Grand River Street in the Village of Howell lying between the west line of Walnut Street and the east line of Court Street, in accordance with the plans and specifications now on file in the Office of the Village Clerk, at which time the Common Council of the Village of Howell will receive and open said bids.

All bids to be addressed to John A. Hagman, Village Clerk, and the envelope, containing same, marked "paving bid." Each bid must be accompanied by a certified check payable to the Village Clerk, to the amount of \$350, as an evidence of good faith on the part of the bidder. This job is to be fully completed between May 1st and July 1st, 1912, and the contractor is to furnish a surety bond in the penal sum of \$3,000 for the faithful performance of the work.

The Council reserves the right to reject any and all bids.

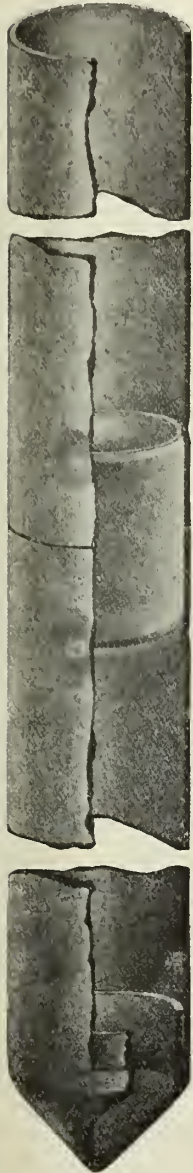
JOHN A. HAGMAN,
Village Clerk.

Dated at Howell, December 26, 1911.

Simmons Sectional Concrete Pile Casings

Are Carrying the Dead Loads of Buildings and the Live Roads of Railroads

Over 2,000 Linear Feet are Supporting New York Structures



For underpinning and where head room is limited, this construction of a pile is unequaled.

We have instances where a pile has been driven over sixty feet without losing its alignment or buckling.

They can be hammered, jacked or jetted in place. Piles of any ultimate length can be built up during the progress of driving.

The sections can be made from 4 to 20 feet long to suit the conditions. Our stocks can be drawn from to supply any desired length of piles.

Send for circulars and prices.

We are equipped for all kinds of Special Machine Shop Work—in Piping, Columns, Railings, Roof Structures, Cold Storage, Flag Poles, Fittings, Valves, Tools and Specialties for Contractors, Engineers, Water Works and Industrial Plants.

John Simmons Co.
101 Centre Street New York

Drival

For All Concrete Surfaces

Is the Best Waterproof Coating

Waterproof, Acid and Alkali-proof, Weather-proof

Apply DRIWAL directly to the cement or concrete surface—no preparation necessary. It penetrates and fills up the pores of Concrete, Cement, Brick, Stone or Stucco, old or new, without obscuring the texture of the surface.

DRIWAL is made in White, Black, Transparent and Beautiful Flat Colors

Black DRIWAL is the best foundation waterproofing. It won't crack with cold. It can be plastered on. It resists acids and alkalis.

White DRIWAL gives a beautiful flat white for mission exteriors, for house and factory interiors.

Transparent DRIWAL gives perfect waterproofing without changing the color of stone, brick or other surfaces.

Fourteen beautiful tints in colored DRIWAL offer unlimited opportunity for artistic decorative effects for exterior or interior surfaces. Write for color card.

BILCHACO

Cement Floor Coating

Saves the floor, makes it oil-proof, dustless and stainless. Made in six colors.

Write for Illustrated Booklet

on costs and methods of Cement and Concrete decoration and waterproofing. Full of valuable information for engineers, architects and contractors.

Booths 326-327 New York Cement Show.
Booth 63 Chicago Cement Show.

The Billings-Chapin Co.

Boston Cleveland New York
Eastern Dept., Billings, King & Co.

Steam Hoisting Engines for Contractors.

Contractors and quarrymen who are interested in apparatus that saves time and money, in connection with power for hoisting and transfer of material, will find valuable information in a catalog recently issued by the John F. Byers Machine Co., Ravenna, O. The firm occupies a large plant at that town, and invests money wisely in developing standard equipment in the form of hoisting engines. Portable and semi-portable machines, derrick cars, derrick irons, hand power blocks and sheaves are included in the plant's output, which has been brought to a fine point of uniformity.

Elevator frames and equipment, for use on building construction, are an important part of the plant's product, with derricks of numerous types, adapted to be erected in the field or in the plant.

Catalogs Received.

New 1912 catalog of the Crescent Machine Co., Leontonia, O., has been issued. It pays particular attention to woodworking saw rigs for the use of the concrete contractor in cutting forms on the job and for setting up in his shop for stationary work.

New general catalog of the Chain Belt Co., Milwaukee, Wis., is cloth bound and contains 278 pages. It lists the company's elevating and conveying equipment and the Chain Belt concrete mixer.

The "Royal" gas engine is illustrated and described in a new catalog issued by the Royal Engine Co., Bridgeport, Conn.

The new catalog of the Coates Clipper Mfg. Co., Worcester, Mass., will interest readers of CONCRETE because it describes mechanically driven tools that may be used in treating concrete surfaces, in place of sand blast or pneumatic tooling.

"H. & B." hammers and other carpenters' tools made by the Humason & Beckley Mfg. Co., New Britain, Conn., are described in a new catalog just issued.

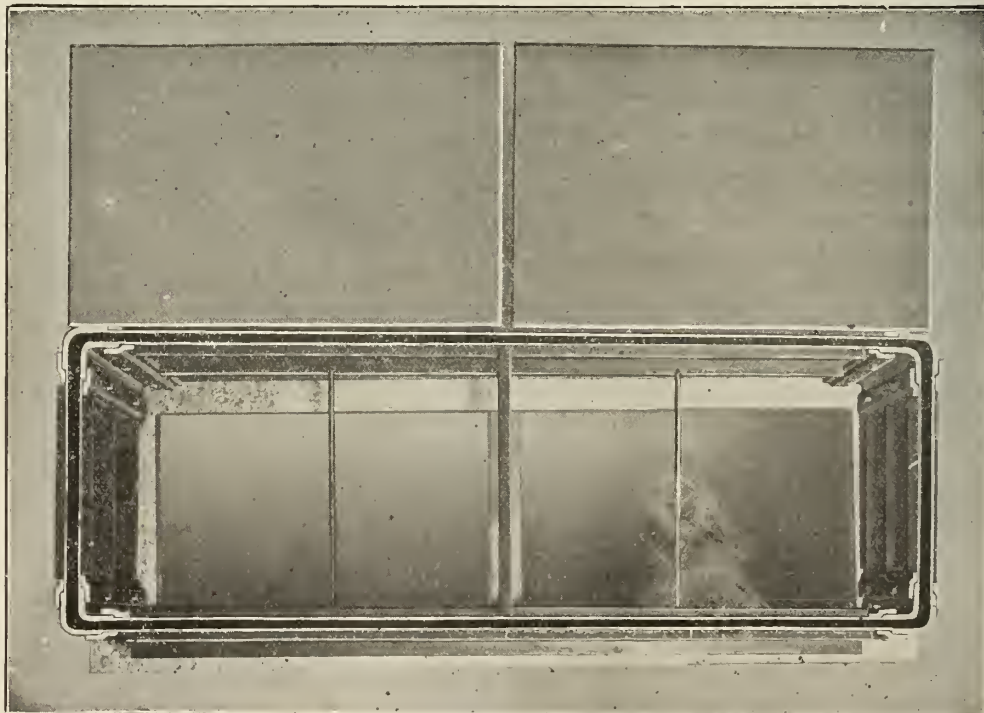
In its most recent catalog, for 1911-1912, the D. & A. Post Mold Co., Three Rivers, Mich., publishes a lot of practical information regarding methods of manufacture and advantages of finished concrete posts. Under the D. & A. system, the matter of steam curing is easily handled. Posts are made in the molds and, still in the molds, are carried to the curing department. The filled molds are placed and removed singly and as each mold is complete in itself, with detachable ends, it is only necessary to place the layers of green posts in the protecting molds in such a manner as to allow for the free circulation of steam. If steam curing is not used, the molds serve as a convenient means of transporting the posts to the curing department, or yard. The new catalog is entitled "Concrete Posts and How to Make Them."

Your Mail at the Cement Show

Have it addressed care of Concrete Publishing Co., space 138, Cement Show, Madison Square Garden, and we'll take care of it for you. Call at our booth and get it.

NATIONAL STEEL REINFORCED CEMENT BURIAL VAULT MOLD

Picture of mold resting on platform showing inside and outside cores. Bottom plates at lower side of picture. Covers inside core. Vault is made by wet process and steel reinforced.

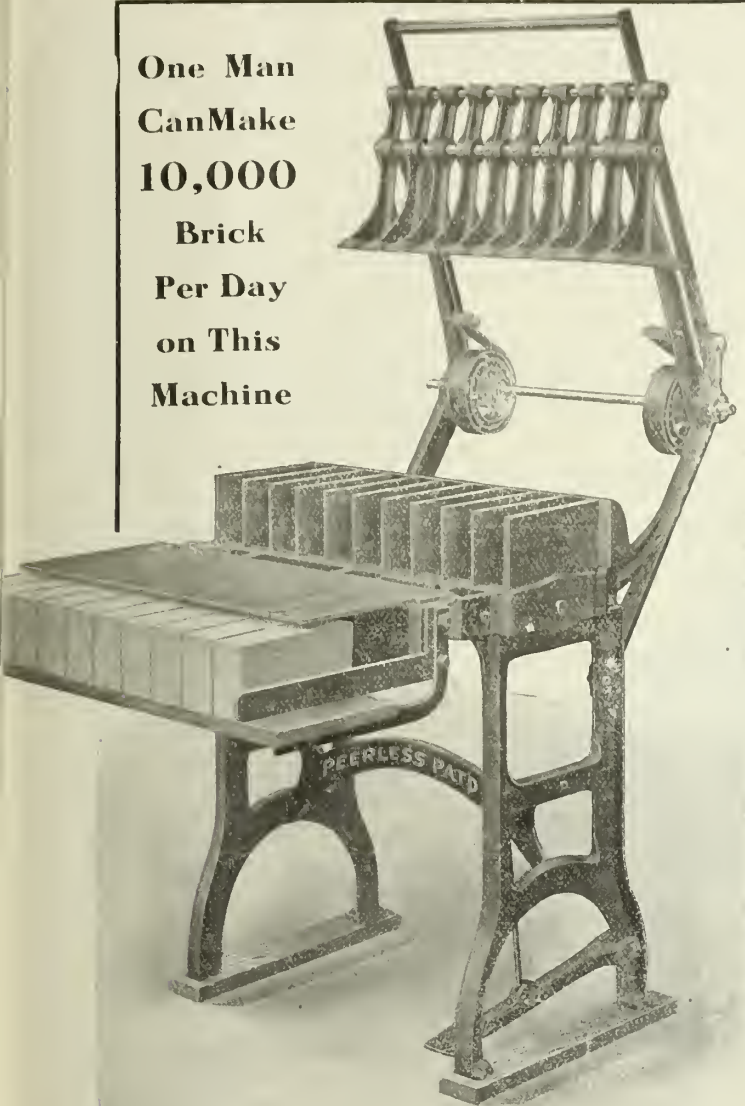


See our exhibits at the New York Chicago and Kansas City Cement Shows

The National mold makes the most sightly, lightest and least expensive Cement Burial Vault on the market. Write for our new catalog

NORWALK VAULT COMPANY, Norwalk, Ohio, U. S. A.

**One Man
Can Make
10,000
Brick
Per Day
on This
Machine**



Peerless Cement Brick Machine

Our new 1912 model contains a number of improvements over earlier Peerless machines, but the basic principle is the same—the principle that makes the Peerless the fastest brick machine on the market.

Note that the base of the Peerless Brick Machine is **heavy**—built to stand hard usage. No chance of the working parts getting out of alignment.

The Peerless tampers strike **straight down**—not a glancing blow. They are convex on their tamping faces—this convexity not only packs the concrete straight down, but forces it out on all sides. This insures dense, firm edges on all brick.

PEERLESS BRICK MACHINE COMPANY

9 North 6th St,

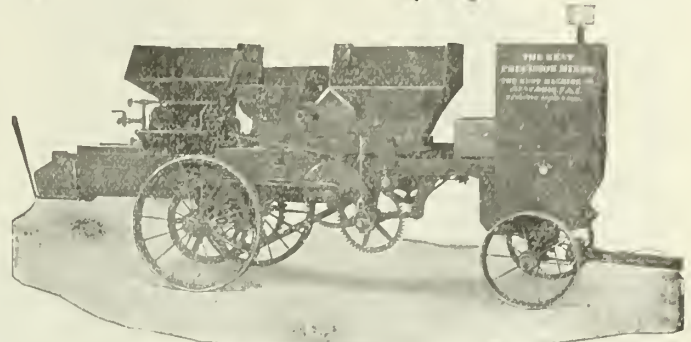
MINNEAPOLIS, MINN.

The Peerless Cement Brick Machine is guaranteed **FOREVER** against breakage, as long as it remains in the hands of the original purchaser.

The "Kent" Precision Mixer

It is a well built concrete mixing machine, built on scientific principles. It measures and proportions materials accurately and delivers mixed concrete at lowest cost.

Get our mixer catalog. Ask about the "Kent" Mortar Mixer.



Address our home office or the following representatives

Kent Machine Co.

310 N. Water St. Kent, Ohio

J. F. Davis & Co., Kansas City, Mo.
Dodge & Dodge, 1133 Broadway, New York.
M. G. Dennison & Co., 144 Cutler Bldg., Rochester
Wm. Pattison Supply Co., Cleveland, O.
Sanford Concrete Machinery Co., Toledo, O.
The W. E. Austin Co., 2 Spring St., Atlanta, Ga.
New Orleans, Houston, Dallas, Oklahoma City, Memphis, Roanoke and Norfolk.
The Beebe Co., Portland, Oregon.

Anchor Machines Make Continuous Air Space Blocks



It is easy to lay
Anchor Blocks.

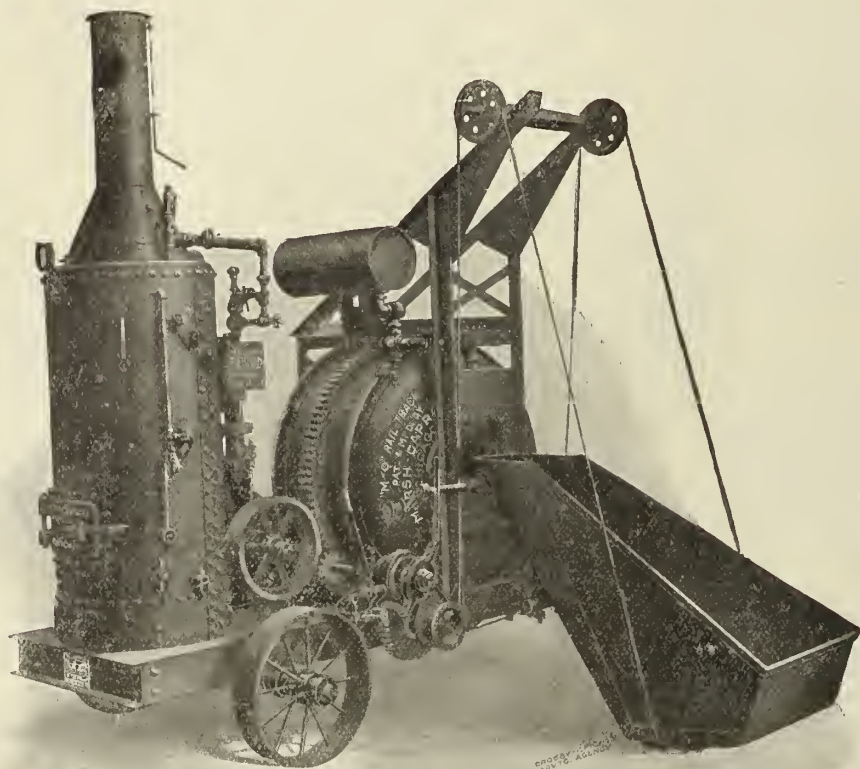
The wall that's guaranteed *frost and moisture proof*.
A perfect dead air space from cellar to garret.
Standard machine makes blocks 8x24 in.—any width from 8 to 12 in.
Junior Machine makes blocks 8x16 in.—any width from 8 to 12 in.

All blocks tied together in construction by four quarter-inch galvanized iron rods 8 in. long and turned 1 in. at each end, guaranteed rust proof and everlasting.

Write for catalogue and special prices. All machines sold direct to the trade.

Anchor Concrete Stone Co. ROCK RAPIDS, IOWA

WHAT SHOW?



have other machines when

Marsh-Capron Mixers

are daily showing such a series of record-breaking performances

ON THE
J O B S
? ? ? ?

Marsh-Capron RAIL-TRACK Mixer with SIDE LOADER GROUNDED.

We shall not exhibit at any cement shows this year.

Wise contractors know that fancy paint, ribbons, and an artificial load is no real basis for judging a concrete mixer needed to do heavy work outside—"on the job."

We will save the money the shows would cost and put it into the M-C machines or take it off the price to you.

Any man up-to-date enough to want to see one of the real record-breaking M-C Mixers IN ACTION can see it "on the job," in any city, any time—as our special guest, at our expense—and to his profit.

"NOWADAYS THERE ARE M-C MACHINES AT WORK ALL OVER TOWN."

Our offices will be a sort of headquarters for the best contractors during the Show. Will you make our office your headquarters? Stenographers to help with your private mail—private quarters to transact your business with your own customers—Every convenience and courtesy are yours with the cordial compliments and healthy (and helpful) good will of

Marsh - Capron Mfg. Co.

477 Old Colony Building

CHICAGO, ILL.

Eastern Agents: Harold L. Bond Co., 78 Beach Street, New York, N. Y.; 383 Atlantic Ave., Boston, Mass.

MASON SAFETY TREAD

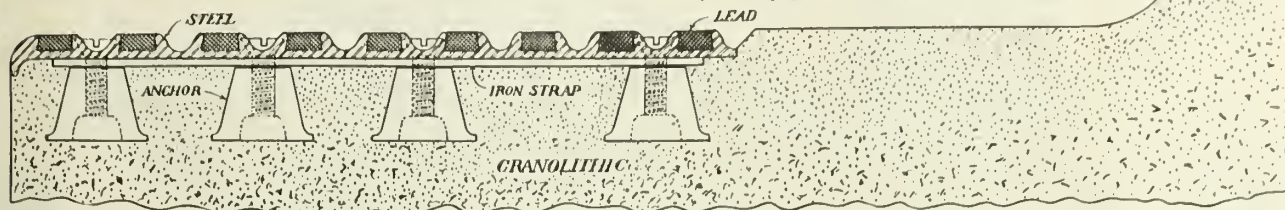
THE ONLY PERFECTLY SAFE TREAD

Should be used on all STEPS—ESPECIALLY CEMENT, also on all public floors and sidewalks. An absolute preventive against slipping on stairs, landings, inclined ways, car steps, sidewalks or any place that may become smooth. Can be fastened to anything, new or old. Will outwear any other surface. In use in every commercial center in America. Write for catalog giving full description and showing where it is in use near you.

American Mason Safety Tread Co., 704 Old South Building, Boston, Mass.

7½" WIDE WITH NOSING EDGE

MASON SAFETY TREAD



15 Days Absolutely Free Trial

You to be sole judge at the end of that time—
if you will purchase a Sanford Press Block Machine.

It is a fact that concrete blocks made by the pressure method are more dense, more uniform, with sharper corners that are as dense as the center of the block, than can possibly be made by the tamp method.

This means more profits.

It is a fact that in the saving of labor cost alone you can pay for a Sanford Press in six months' time, to say nothing about the better quality of block that you turn out.

This means more profits.

It is a fact that you can double your output on a Sanford Press with the same amount of labor cost. You will have no trouble in securing men because the work is easier, and your blocks at the end of the day have the same density as the first block made in the morning. **This means more profits.**

This machine is interchangeable and can be adjusted to make blocks from 4 to 24" in length, 6 and 8" height of face, 4, 6, 8, 10 and 12" thickness of wall; fractional parts to full capacity of the machine are made at one operation, and any

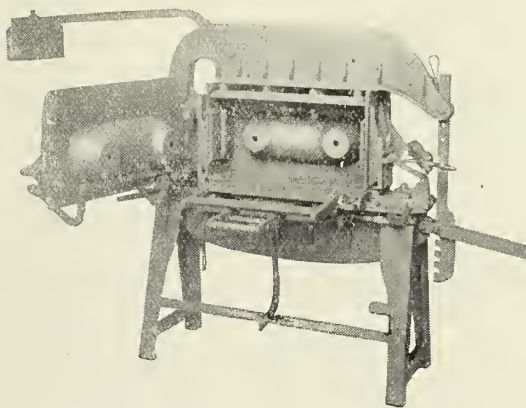
face design that may be desired.

You can make any curve or angle block, header bond two-piece system, metal tie two-piece system, slab or veneer block, hollow block, with vertical and horizontal air space, silos, water tables, etc.

You can face your block on one or all four sides at one operation of the machine. In fact, you can make anything that is ordinarily required in building construction.

It is absolutely the only down-faced hollow block pressure machine on the market, and is protected by

broad basic patents.



**SEND FOR
MIXER PROPOSITION**

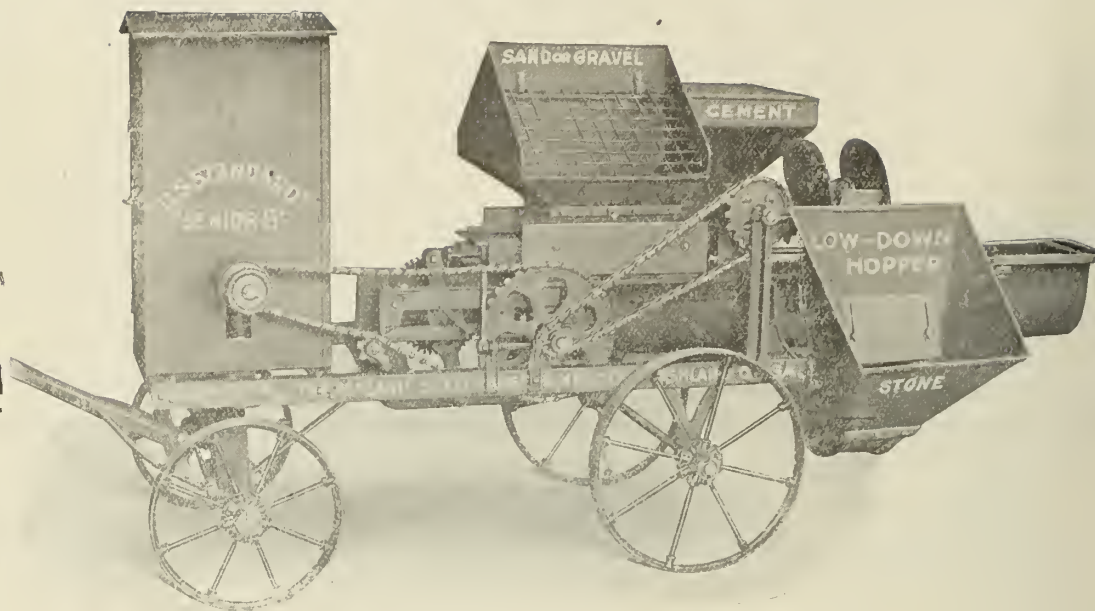
You take no risk—just say the word and a "Sanford" will be placed in your plant to be tested out to your own satisfaction for 15 DAYS.

ABSOLUTELY FREE TRIAL

You are under no obligation at the end of the free trial—if you can fairly say that the "Sanford" does not turn out a better block and more of them—you send it back.

Think of that. Write today and get full information on the GREATEST BLOCK MACHINE offer ever made. Send us your name and address and we will send you a proposition that will certainly open your eyes. Be on the safe side and write us NOW. There is not a better machine made at any price. Don't wait—do it now while you think about it.

The Sanford Concrete Machinery Company
TOLEDO, OHIO



U. S. Standard Senior B. Concrete Mixer

This type of the well known U. S. Standard Self-Proportioning Continuous Mixers is a three-hopper machine designed for general contract work. It accurately proportions cement, sand and gravel or stone up to $2\frac{1}{2}$ in. in diameter, and feeds these materials positively. Capacity, 90 to 100 yards per day. Note the low down stone hopper.

Special types for all kinds of concrete work. Ask about our Block Plant Mixer, mounted on steel base.

Get Our Catalog

Our new catalog D will save money for you. Lists continuous mixers and face-down block machines. Write for a copy today.

At the Cement Shows

See U. S. Standard Concrete Machinery on exhibit at the New York Cement Show, Space 188; Chicago Cement Show, Spaces 226, 227 and 228.

The Ashland Steel Range & Mfg. Co.

MANUFACTURERS OF

U. S. Standard Concrete Machinery
ASHLAND, OHIO.

U. S. Standard Face-Down Block Machine

One of the oldest face-down machines on the market. From four to six oval cores in each block, cutting down material costs without weakening the block. Use wetter mixture than with other machines.

If you are in the market for a block machine, write for full information about the U. S. Standard.

You Can Make Big Money Building Concrete Silos

It isn't necessary to dwell on the demand for concrete silos. Every contractor knows that up-to-date farmers and dairymen are demanding the more permanent structure to take the place of the expensive, unsatisfactory stave silo.

From 75% to 100% profit can be made by the contractor putting up concrete silos, providing he uses the right equipment. At the same time, the silo costs the farmer less at the end of five years than any other form of construction.

Our metal moulds for silos are made in two sections, each 3 ft. high. Both are set up on the foundation and filled. The lower one is removed and placed on top for

another course, and so on. The course most recently poured is always retained in its form until set. Six feet of wall can be built each day.

Each set of silo forms includes a special form for moulding concrete chute at the same time that the silo walls are poured. Provision is made for steel ladder embedded in the concrete and continuous wooden doors fitting in grooves in the concrete door-jambes. The concrete is mixed wet. Roof is also made of concrete. A complete proposition.

This is a business that should appeal to every small-town contractor. The same moulds will make reservoirs, tanks, storage cribs, etc.

Monolithic Silo and Construction Company

854 Peoples Gas Bldg., Chicago, will send a free booklet about monolithic silo construction to any reader of CONCRETE who asks for it.

Concrete Marble

For Exterior and Interior Trim

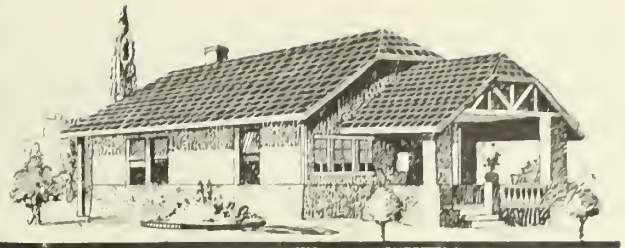
Shop Rights

Or exclusive City or County rights for sale, giving many formulas, processes and methods for making polished concrete marble direct from the molds, in solid colors or with all the colors, shadings, veining and blending of the most expensive marbles. No machinery required. Simply cheap molds which almost anyone can make. The product is used and adapted for Floors, Baseboard, Stair-treads, Table Tops, Bank, Store and Bar Counters, Exterior Building Trim, Porch Work, Show Case Bases, and an infinite variety of interior decorative work, in Mantel, Fireplace and Bathroom work. This special section in connection with seven other sections devoted to the general concrete industry will equip you at little cost to vastly improve your entire output, and your profits. For literature, etc., address

ART STONE CO.

Amos Stouffer, Prop.

BOX 304, WAYNESBORO, PA.
See my exhibit at the New York Cement Show.



Put a Slate Roof On Your Concrete Bungalow

As the strength, solidity and sightliness of concrete inspires you to build your bungalow of that material, you should and will ROOF it with SLATE for the very same reasons.

Both blend harmoniously, each emphasizes the efficiency of the other—both unite in forming structural perfection.

As the roofing for your new home, use

Sea Green and Purple ROOFING SLATE

Slate being of solid rock is the cheapest roofing because it is imperishable—so

Slate, like concrete, absolutely resists the action of air, water, fire, sun, lightning and time—is never affected by ROT or RUST; will not crack or warp. It has all the good qualities that other roofings lack—wears seven times better than galvanized iron—wears two-thirds longer than a copper roof, which costs more. Slate outlives shingles seven times and tin four times. Felt roofing, cheapest of all, has practically NO LIFE WHATEVER.

Now, while you are planning your building, while there is still time, order Sea Green or Purple Slate roof for the new building.

Send for "Roofs"

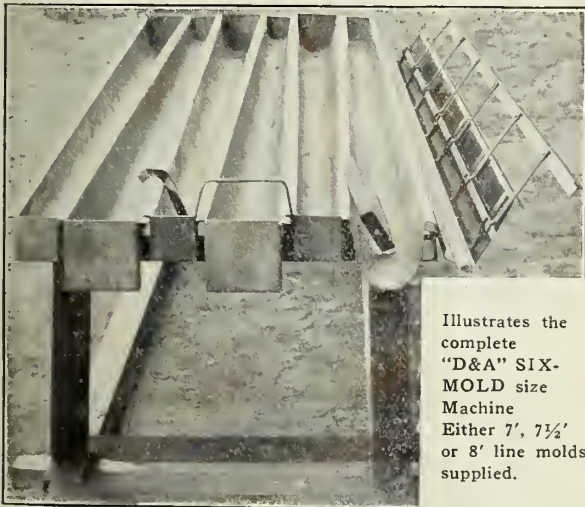
This interesting little booklet contains many practical and helpful hints that show how to save money in selecting roofing material. It tells just such things about roofs that every prospective home builder ought to know about this vital question.

Write for YOUR copy today.

American Sea Green Slate Co.

(Roofs that never wear out)

170 CLARK STREET, GRANVILLE, N. Y.



Illustrates the complete "D&A" SIX-MOLD size Machine Either 7', 7½' or 8' line molds supplied.

Before You Buy, Investigate

"D&A" Cement Post Machines

Make Six and Ten Posts at one time.

"D&A" MOLDS for all sizes and lengths of Line Posts, also Anchor and Brace posts and Pole Molds.

A profitable investment for any Cement Products Plant. One sack Cement, 1/6 yd. gravel, 12 lbs. steel and ¾ hour labor will make six posts, at a cost of less than 16c each.

"D&A" Molds are in use in all parts of the U. S. and many foreign countries. Eleven Ry. Co.'s., U. S. Dept. of Agr., and Dept. of War; leading Portland Cement Co.'s.

The "Shaking System" which makes them Wet (not slush), no pallets, no tamping. "D&A" Tie wires fasten fences securely and most cheaply.

10,000 "D&A" CEMENT FENCE POSTS

Manufactured by

D., L. & W. RY. CO. at BOONTON, N. J.

Strength, Durability and Low Cost are features of "D&A" POSTS, the "Shaking System." No tamping, no pallets or planks used.

Over 300 "D & A" Molds are used at this plant. More than 15,000 Posts made during 1911, being set along their lines in that vicinity. Posts are made at rock quarry, entirely from crushed rock, and are as white as snow and as smooth as paper.

1912 Catalogue Free, explaining "D & A" Post Machines in detail. Prices and Discounts upon request. See our exhibits at the Cement Shows.

D. & A. POST MOLD CO.

212 Third Ave., Three Rivers, Mich., U. S. A.

8 Interesting Letters

Kramer Automatic Tamper Co., Madison, Lake Co., Ohio, Nov. 17th, 1911.
Peoria, Ills.

1. Gentlemen:—
Replying to your favor of the 3rd inst., in regards to the working of the Tamper you sold me last Spring, I will give you a few of the remarks I hear everywhere I go in regards to my blocks, which I never heard before I got the Tamper. One man said he would sooner have my 8x8x16" blocks than any 8x10x16" hand tamped block made. Here is the last order I got. This is the way I received it. A gentleman came to my shop November 4th, and stood and looked at the Tamper running, while I was cleaning up. I told him I would be through in a few minutes. He said he just wanted to see it run, was all. He asked me what I wanted for my blocks. I told him and he said, get me out 1500 soon as you can, and he is hauling them now. They ask me why I don't keep them on hand. I have given that up since I put the Tamper in. The only way I could get any ahead would be to sell the Tamper, and then I would get a yard full.
I have now at present, orders to make yet this fall 2500 blocks.
Sorry to say that I could not get you a photo of my place. I have built another large building, 30x60.
I should advise any block manufacturer to have a Kramer Tamper installed, as mine has paid for itself this season.
Now I have not told you how many you could make, as that depends on what kind of help you get. We have made 3 in one hour, and have made 3 in 1 1/2 minutes. If you want to know anything about the repairs, you can find it is not very much. The cost to me was only \$6.00.
Hoping this will be satisfactory, as I could talk Tamper day and night.
I will answer any letters, stamps enclosed,

Respectfully yours,
CHAS. S. ELDRIDGE.

Kramer Automatic Tamper Co., Waterville, Maine, Nov. 10th, 1911.
Peoria, Ills.

2. Gentlemen:—
After using your Automatic Tamper nearly two years, making Miracle Double Air Space Blocks, I have only words of commendation for the work the machine does. Blocks can be made faster, and much easier and of better quality, than by hand tamping.

Yours truly,
EMERY HILL CON. CO.,
Edwin Towne, Treas.

Kramer Automatic Tamper Co., Hampton, Iowa, Nov. 14th, 1911.
Peoria, Ills.

3. Gentlemen:—
The automatic Tamper that I bought of you last Spring at the Chicago Cement Show has given the best of satisfaction, both as to quality and quantity of blocks produced.
As to the quality, the machine tamped blocks weigh about ten per cent more than the hand tamped, proving that the machine tamped blocks must be more dense.
I use facin on all blocks, and make the concrete wet enough so that the water shows on the outside of the blocks when removed from the machine.
I consider the tamper will double the output of a crew of two, three or four men. As to speed, four men have made five 8x8x24" with facin and carried them away to cure in five minutes and twenty seconds.

Yours truly,
G. E. SARGENT.

Kramer Automatic Tamper Co., Cleveland, Ohio, Dec. 12th, 1911.
Peoria, Ills.

4. Gentlemen:—
In regards to your letter of the 7th inst., on the merits of your Tamper installed in my shop, I must say I have seen several different kinds of tampers, but have not seen any which I would trade mine for. I installed it about 18 months ago, and have had very little trouble with it.
I would not part with it for \$500 if I could not get another one. No block maker can afford to be without one, because it makes a much better block than you can make by hand.

Yours truly,
H. P. BENNETT.

Kramer Automatic Tamper Co., Lafayette, Ind., Nov. 17th, 1911.
Peoria, Ills.

5. Gentlemen:—
After having used "The Kramer Automatic Tamper" in connection with the making of all cement blocks, we are pleased to report that it has proven satisfactory in every respect, and we are well satisfied in every respect with the results obtained.
Heretofore it was practically impossible to produce and market blocks as we wished, but since the installation of your Tamper, all the "hand tamped" defects have been eliminated, which has created a demand for "Kramer Automatic Tamped Blocks."
Owing to the simplicity of the "Kramer Automatic Tamper," it very seldom needs attention, and as yet, after good hard usage, has not inconvenienced us in the least.
We will be glad to recommend the Kramer Automatic Tamper to any one, at any time, so do not hesitate to use us.

Yours very truly,
HENRY J. KESSENER LBR. CO.,
Will D. Kessener, Treas.

Kramer Automatic Tamper Co., Lincoln, Nebr., Nov. 16th, 1911.
Peoria, Ills.

6. Gentlemen:—
In answer to your favor of the 4th inst., will say that we have had in use a Kramer Automatic Tamper, which has given perfect satisfaction.
The tamper, unlike men, never tires, and as it is easily operated, the men can work fast the entire day. In our shop with three men who do their own mixing, we turn out daily eight hundred linear feet of stone.
Thanking you for this opportunity to make public our approval of the Kramer Automatic Tamper, we are,

Very truly,
THE REIMERS KAUFMAN CO.

Kramer Automatic Tamper Co., Valley City, N. D., Dec. 11th, 1911.
Peoria, Ills.

7. Gentlemen:—
Regarding your letter of the 8th inst., I will say that your Tamper has given me good service. I have run it two years now without any extra expense but a new chain.
Since I have installed your Tamper I find I can make 200 more blocks in ten hours, and besides, I can use them a good deal sooner, and find that I have a good deal better results. The Tamper puts more material in them than can be done by hand. And I have a good deal better sales and twice the satisfaction.

Yours most truly,
W. J. CURREN.

Kramer Automatic Tamper Co., Waterloo, Iowa, Nov. 15th, 1911.
Peoria, Ills.

8. Gentlemen:—
Replying to yours of the 4th inst., in which you ask how we like the Kramer Tamper we have used the Kramer Tamper for four years, in our Block Plant at Waterloo, and our experience with the machine has caused us to name it the "Dividend Payer."
Having tamped blocks by hand for a period of five years previous to installing the Tamper, we are in position to know the difference in labor cost for producing the blocks. The Kramer Tamper reduces this cost fully 50 per cent.
The quality of the blocks made by the Tamper is fully thirty-three and a third better by reason of the fact that the block maker can use a wetter concrete and can pack so much denser. We find our blocks are practically waterproof. We cannot get along without the Kramer Tamper. Wishing you unbounded success, we remain,

Yours truly,
CONCRETE STONE CO.,
H. L. Green, Mgr.

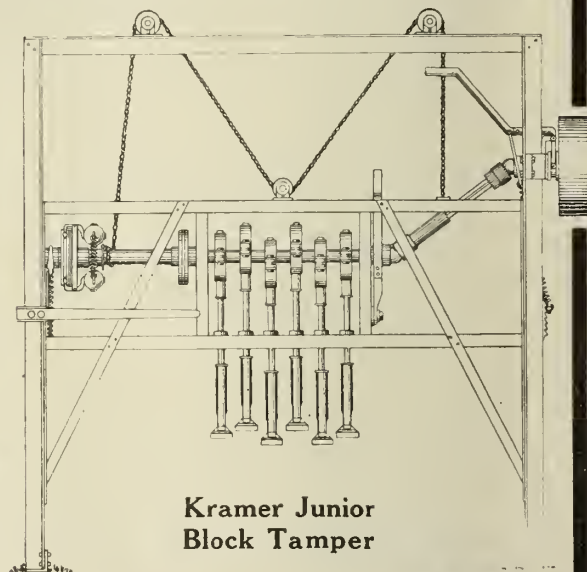
Kramer Automatic Tampers

THE KRAMER JUNIOR BLOCK TAMPER is built of steel and is a great achievement for simplicity, and durability. The tampers are mounted on springs, making the stroke an elastic one. These springs also act as a shock absorber, which enables the lightest and frailest kind of a block machine to withstand the terrific tamping exerted by it, without wrecking the mold box.

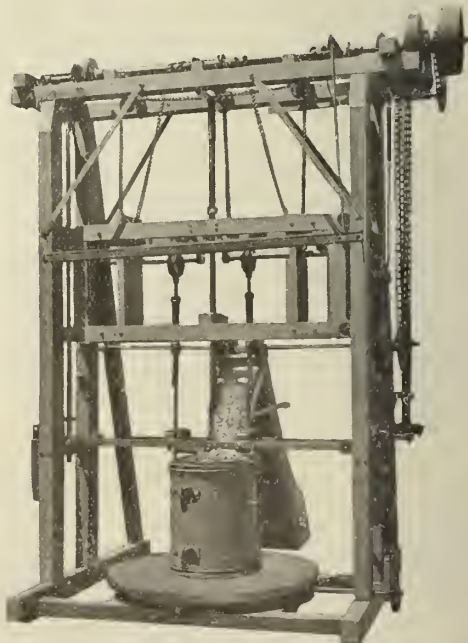
It will successfully work on any size or style block machine. It will increase the output of your plant over 100 per cent, and reduce the cost fully 50 per cent.

The correctness of our statement is vouched for by hundreds of satisfied users.

See our Tampers at Space 162, New York Cement Show.



Kramer Junior Block Tamper



The Kramer Tile Tamper.

A real machine for making large Sewer and Drain Tile. It has two tampers striking 600 blows per minute; it will tamp Tile to any density, does not require any pallets for either drain or sewer Tile. Let us tell you all about these machines. Write today.

Kramer Automatic Tamper Co.

491 S. Adams Street - - PEORIA, ILL.



Cure for Sidewalk Builder's Backache

You not only get your work done with less effort and less fatigue, but you can do from four to five times as much as by the old methods, if you use

Arrowsmith Long Handled Finishing Tools

These tools are not a novelty. They have been on the market several years. Thousands of contractors are using them. They are saving time, saving labor, saving money. They get their work done quicker. They make bigger profits.

We send these tools to you to try for 10 days. We know you'll like them. If you lay concrete sidewalks or floors, write today for our catalog of long-handled finishing tools and ask about our 10-day trial offer.

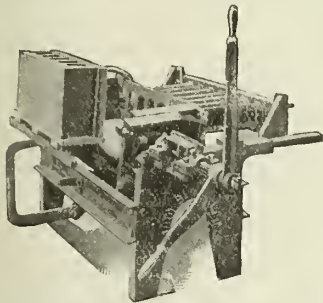
It will pay you.

Arrowsmith Concrete Tool Co., Dept. C-1 Arrowsmith, Ill

HAYDEN CONCRETE BLOCK MACHINERY

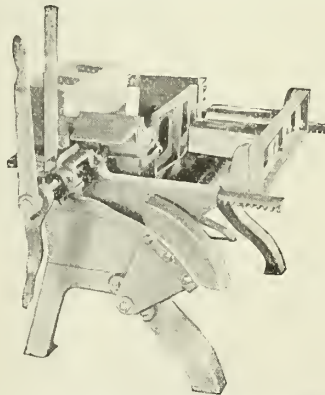
repair parts, or want to add a second machine to your equipment. Our line is large. booklets describing those machines.

Our line of machinery today represents the best ideas for mixing and molding concrete into building units. When you buy a Hayden machine you buy of an old established company, one that you know is going to be in business in case you want Tell us just what machines you are interested in and we'll send



The New Hayden 24 in. Down-Face

This new Hayden 24 in. Down-Face machine makes blocks any thickness of wall from 4 in. to 16 in. height of block from 4 in. to 12 in., any length from 2 in. to 24 in. Blocks all styles of faces in straight, angle and circle work. Write for circular.



Hayden Automatic Down-Face Block Machine

Made in the following sizes: 16, 18, 20, 24, 32 and 36 inch. Built on correct principles--one of the oldest face down block machines on the market. It has been kept right up to the minute with modern improvements.



Hayden Stripper--For Plain Face Block

The Hayden Stripper is used in turning out standard blocks of plain design, for stucco walls, foundations, etc. It pays for itself quickly. You don't have to operate an expensive machine on a low-priced product--make your plain block on the Stripper. Wet mix may be used.

Any Pallet Will Fit Them: We build these machines to fit any pallet no matter what size or make, at no extra cost to you.



Concrete Mixers

Highest grade concrete mixers. Write us before buying.



Block Maker's Trowel

Only trowel on the market designed specially for the block maker. Blade of the best saw steel, highly tempered and polished, with edges slightly rounded. Size 12 in. long, 5 in. wide. Very durable; brass handle, adjustable so worn blade may be replaced by a new one.

SEE US AT
New York-spaces 190-191
Chicago " 212-213
Kansas City " 52-53

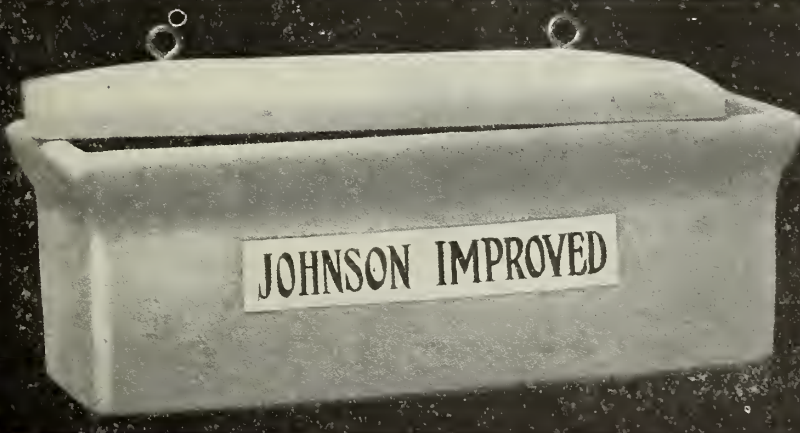


Ornamental Molds

You can order molds for a few ornamental pieces--pedestals, columns, caps, etc.--and as the demand increases for product, add to your line. Ask about our adjustable Angle Molds, adjustable Sill & Lintel Molds, etc.

HAYDEN AUTOMATIC BLOCK MACHINE COMPANY

112 West Broad St., Columbus, Ohio



Let Us Drop a Dollar In Your Pocket

We are going to make this a banner year for the Johnson vault mold. Let us tell you about it--let us show you how you can make money with this mold, with a small investment.

Johnson Vault Mold Co.

Greenfield, Ind.
Eastern States

Topeka, Kans.
Western States

GENUINE BANGOR

Roofing Slate, Structural Slate, Blackboards

EAST BANGOR CONSOLIDATED SLATE CO.

Large Facilities

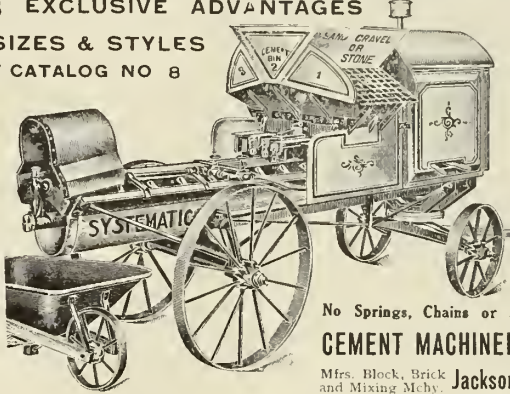
EAST BANGOR, PA.

Prompt Deliveries

SYSTEMATIC CONCRETE MIXERS

28 EXCLUSIVE ADVANTAGES

6 SIZES & STYLES
GET CATALOG NO 8



No Springs, Chains or Sprockets

CEMENT MACHINERY CO.

Mfrs. Block, Brick and Mixing Mchys. Jackson, Mich.

HOTEL GERARD

West 44th Street, between Broadway and 6th Avenue

Most Convenient Location in New York



Rates:

Single Room without Bath
\$1.00 and \$1.50 per day
Room with Private Bath
\$2 per day and up
Parlor, Bedroom and Bath
\$18 to \$25 per week

Banquet Room for Private Luncheons,
and Dinners for Clubs and Societies.

JOHN RANKIN - Prop.

WHEN *New York* STOP
IN *AT*

THE NEW FIRE-PROOF NAVARRE

Seventh Ave. & 38th Street
BUSINESS MEN FAMILIES TOURISTS
Maximum of Luxury at Minimum of Cost.



ACCESSIBLE—QUIET—ELEGANT

Within Five Minutes' Walk of Theatres, Shops and Clubs. 300 Feet West of Broadway.
New Dutch Grill Rooms. Largest in the City. Electric Cars pass Hotel to all Railroads.

EUROPEAN PLAN

\$1.50 per Day WITHOUT BATH
\$2.00 per Day WITH BATH
Suites, \$3.50 and upwards

SEND FOR COLORED MAP OF NEW YORK

EDGAR T. SMITH, Managing Director

Plaza Hotel, Chicago, under same management.

Hotel Imperial

Broadway, 31st and 32nd Streets, New York City

ABSOLUTELY FIREPROOF

*Only one block from the New
Pennsylvania Station and Con-
venient to New York Central*

Across the street is the newly completed terminal of the Hudson tubes.

The IMPERIAL is the Headquarters for members of the cement trade. The minimum rate is \$2.00 per day.

It is important that all delegates who expect to be present during the Convention should engage their accommodations at the Imperial as early as possible.

Booklet with tariff on application to Copeland Townsend, Manager.

Make This Hotel YOUR Headquarters

*Headquarters for the
New York
Exhibition*

HOTEL SEVILLE

Cor. Madison Ave. and 29th St.

New York

Two Blocks from the Cement Show

Strictly First Class

Edw. Purchas, Mgr.

Rates:

Single Rooms, \$2.00 upwards
With Bath, \$2.50 upwards

Double Room (for two)
\$3 00 to \$6 00 per day



The "Simplex" Improved Mixer

1912 MODEL

3 Hoppers, Continuous Feed, Rolling Mix, Lown Down Steel Frame. Strong, Simple, and Accurate.

"THE MILES"

No. 5, Face Down, Wet Concrete Block Machine

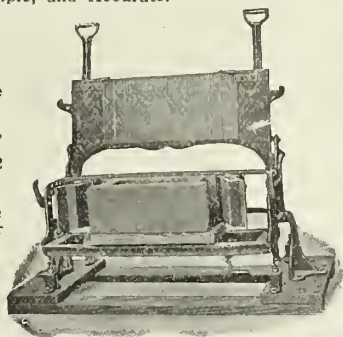
Makes Stone
In Lengths, 4, 6, 8, 10, 12, 16, 18, 20, 22, 24 inches.
In Widths, 4, 6, 8, 10, 12 inches.
In Heights, 4, 6, 8 inches.
Also Angle Stone, Circle Stone, Gable Stone, Hollow or Solid Stone.

THE CONTRACTOR'S FRIEND,

Simple, Strong and Rapid.

LOWEST IN PRICE.

Write for New 1912 Catalogue.



THE MILES MFG. CO., 315 E. Franklin Street
JACKSON, MICHIGAN



GANDY

Stitched Cotton Duck Belting

Has This Edge Painted Green

One more distinctive feature, so that you can recognize at a glance THE GANDY BELT.

The rest of the belt will remain red as before, and will continue to bear our brand, THE GANDY BELT, and our trade mark, A COIL OF BELT AND A BALE OF COTTON LAID ACROSS IT, painted upon the belt at intervals throughout the entire length of the roll.

We take these precautions in order to protect you against the many imitations that unscrupulous dealers have endeavored to palm off as THE GANDY BELT.

Remember, the first cost of THE GANDY BELT is only about one-third as much as leather belting, and about two-thirds as much as rubber belting, yet it will do the work equally as well.

It has justly earned its present reputation of being the most durable and economical belting for driving, elevating and conveying.

We will gladly send you samples and prices. Give GANDY a trial. We can save you money on your belt purchases.

The Gandy Belting Company

753 W. Pratt St., BALTIMORE, MD.

New York Office—88-90 Reade St.



20th Century Concrete Mixer

Runs on its own power
like an automobile

A 20th Century Mixer starting on an 8-mile jaunt, and it got there.

Say, Mr. Contractor:—

If Low Hoppers Dry Mix and Traction Features appeal to you there is only one Mixer for you to consider.

These are not all the good points, but enough. We replace all broken parts proving defective, but with Semi-Steel Castings it's a cinch.

WRITE FOR CATALOGUE

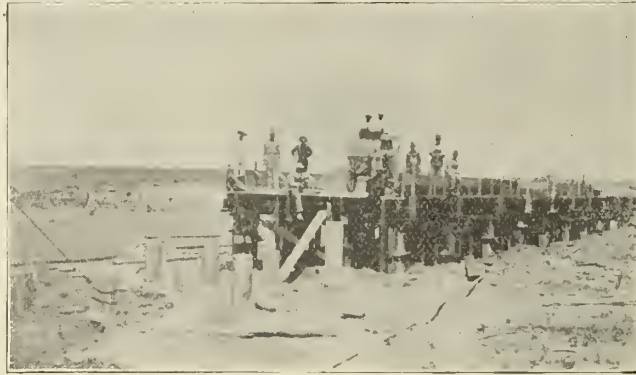
20th Century Mixer Co.

CONNERSVILLE, IND.

Meet us at the Chicago Cement Show, Feb. 21 to 28
Kansas City, March 14 to 21

On the State Highway in Colorado

"Under the Efficient Supervision of the
STATE HIGHWAY ENGINEER"



Forms in place. Sand and gravel placed along the top Coltrin moved along as the work progressed. Length of bridge 354 ft.

The Cement Mach. Supply Co.,
Denver, Colo.

Fort Morgan, Colo., Nov. 11, 1911.

Gentlemen:—We enclose several pictures showing two reinforced concrete bridges recently constructed by us over the east and west channels of the Bijou Creek, Morgan Co., Colorado, on the State Highway road and under the efficient supervision of State Highway Engineer, Mr. J. E. Maloney. The large bridge is 354 ft. long by 17 ft. wide and the smaller one 128 ft. long by 17 ft. wide. After the forms were in place, sand and gravel were placed along the top and the Coltrin was moved along as the work progressed, which would have been impracticable with the heavier or batch type of machine. The No. 12 Coltrin was used exclusively on this work and is worthy of the highest praise.



The Completed Concrete Bridge, 354 Feet Long.

Not a word of complaint from the engineer in charge and the mix was perfect throughout the job. As you know this is our second Coltrin mixer and we have found them practical on all kinds of work and inexpensive to operate.

Have had no repairs worth mentioning so you can see how pleased we are with the Coltrin machines.

Wishing you further success, we are,

Yours very truly,

LEGGETT & McCRONE,
Contractors.

"Not a word of complaint from the engineer in charge and the mix was perfect throughout the job."



Write for Catalog.

"As you know, this is our second Coltrin Mixer and we have found them practical on all kinds of work and inexpensive to operate."

The COLTRIN CONTINUOUS-BATCH MIXERS

SHIPPED ANYWHERE ON FIVE DAYS' TRIAL

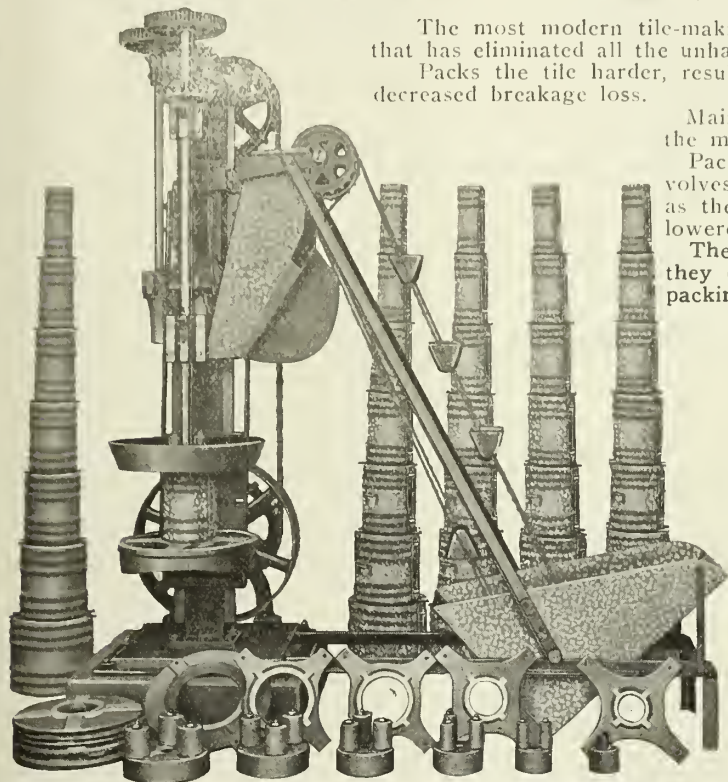
STEAM—ELECTRIC—GASOLINE ENGINE—STATIONARY—HAND POWER

SEE THEM AT THE

NEW YORK, CHICAGO AND KANSAS CITY CEMENT SHOWS
THE KNICKERBOCKER CO., JACKSON, MICHIGAN

THE ROSBRUGH

CEMENT TILE MACHINE



The most modern tile-making equipment on the market—a machine that has eliminated all the unhandy, expensive features of older machines. Packs the tile harder, resulting in increased speed of operation and decreased breakage loss.

Main frame is one solid casting—nothing about the machine to work loose or break.

Packer shaft doesn't raise and lower but revolves in one position. The tile mold moves up as the concrete is fed in and back and then is lowered until it clears the packer.

The Rosbrugh can make drain tile faster than they can be handled by any known system of packing or carrying away.

Rosbrugh No. 1 makes drain tile 4, 5, 6, 7, 8, 10 and 12 in. in diameter, 12¼ in. long.

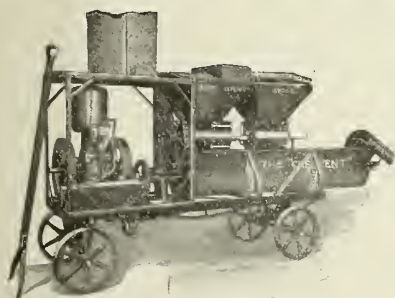
Rosbrugh No. 2 makes drain tile 4, 5, 6, 7, 8, 10, 12, 14, 16 and 18 in. in diameter, and 12 and 18 in. long.

Write for illustrated folder describing the machine and giving tables of cost of cement tile manufacture.

NAPPANEE IRON WORKS

NAPPANEE

INDIANA



Showing Mixer With Stone Hopper

How Your Neighbor Makes Money

YOU profit by the experience of others, or, in other words, we profit by the experience of *each other*. For instance—if John Jones is putting money in the bank by making cement tile and brick, don't you stand the same chance? And if Sam Brown is cleaning up a bunch of money by using an up-to-the-minute mixer, what's keeping you from doing the same thing? Take an inventory of yourself, and then let us tell you how John Jones and Sam Brown are doing it with

"Crescent" Continuous Concrete Mixers—The simplest, strongest, most practical and handy mixers on the market. Proportions wet and dry materials accurately, and mixes thoroughly. The price is low. Every cement worker should have one. We guarantee it.

"Crescent" Sewer Pipe and Tile Molds—Used the world over, and by Uncle Sam in his reclamation work. All sizes 4" to 48". Bell-up or bell-down on same mold, with or without pallets. We employ over 500 patterns in making pipe and tile molds alone. We can explain every "in and out" of this business.

"Crescent" Vertical Tamping Brick Machines—The only practical and scientifically correct machine on the market. Our 1912 model has a big feature that revolutionizes brick machines—the combined hopper, stripper and finisher, combined and patent facing plate. You will want it if you see it.

"Crescent" Power Tile Machines—To make tile 3" to 10". The price is very low. This machine alone is a big profit producer. Can be operated by one man. Utmost strength. Exclusive features.

We Will Exhibit at

New York Show, Jan. 29 to Feb. 3, Booth 282
Chicago Show, Feb. 21 to 28, Booth 138-139
Kansas City Show, Mar. 14-21, Booth 70

SEND THIS NOW

Raber & Lang Mfg. Co.

802 Mill St.

Kendallville, Ind.

Fill Out and Send to Us

Raber & Lang Mfg. Co.,

Kendallville, Ind.,

Please send prices and free literature on the following:

☐ Mixers ☐ Tile Molds ☐ Brick Machine ☐ Power Tile Machine

Name

Address



"Crescent" Sewer Pipe Mold

WRITE
1121 THE ROOKERY
CHICAGO
 or
90 WEST STREET.
NEW YORK
 for
PAMPHLET
 on
CEMENT

ROBERT W. HUNT JNO. J. CONE JAS. C. HALLSTED D. W. McNAUGHER

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BUREAU OF INSPECTION, TESTS AND CONSULTATION

CEMENT INSPECTION

Inspection of Reinforcing Steel at Mills

Physical and Chemical Tests of All Kinds

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Van Guilder Hollow Wall Concrete Machine—A Continuous Air Chamber from Cellar to Roof

Steel Reinforcement Thruout

Completely revolutionizing building methods.

The material is manufactured and the hollow concrete walls built with one operation, saving manufacturers' profits, transportation charges and half the labor cost, yet producing a more durable and up-to-date building.

Only one machine needed for each job.

Van Guilder Houses Cost Less than Wood and Sell Quick at a Wonderful Advance.

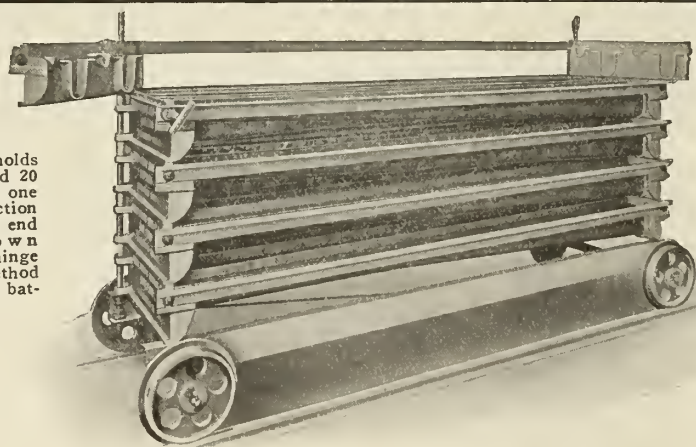
They have stood the test for three years and are long past the experimental stage.

This superior construction was immediately approved by the building departments of New York, one of the most severe and conservative boards in the world.

Van Guilder Hollow Wall Co. 728 Chamber of Commerce Bldg., ROCHESTER, N. Y.

See our demonstration, spaces 310 & 311, balcony, New York Cement Show, Madison Square Garden, Jan. 29th to Feb. 3rd

SILO WALLS
 ..Our curved silo machine produces a silo which is waterproof and frostproof, greatly improving the quality of the ensilage. The most economical and durable construction in the world.



Batteries of molds making 30 and 20 wet posts at one time. Top section emptied and end frames thrown back on hinge showing method of emptying battery.

CONCRETE FENCE POSTS

T-Shape makes them

Strongest--Lightest--Cheapest

Our molds and posts are used all over the world. Used by leading U. S. railroads and interurbans. We guarantee our molds absolutely. See our exhibits at the New York, Chicago and Kansas City Cement Shows.

Will exhibit at the Cement Show held in New York, January 29, February 3; Chicago, February 21-28; Kansas City, March 14-21.

OHIO POST MOLD CO.

1341 Nicholas Bldg., Toledo, O.
Write for our catalog.

The Reliance Pulverizer

A machine that will crush rock and other material to a product ranging from

$\frac{1}{4}$ " size to DUST
 at ONE OPERATION

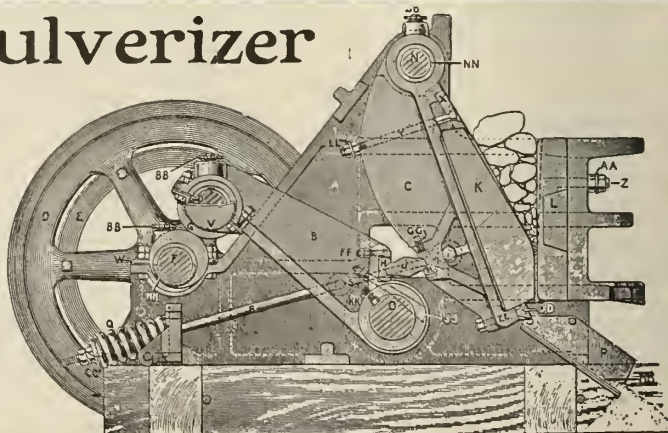
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Universal Road Machinery Co.
 KINGSTON, N. Y.

Boston

Rochester

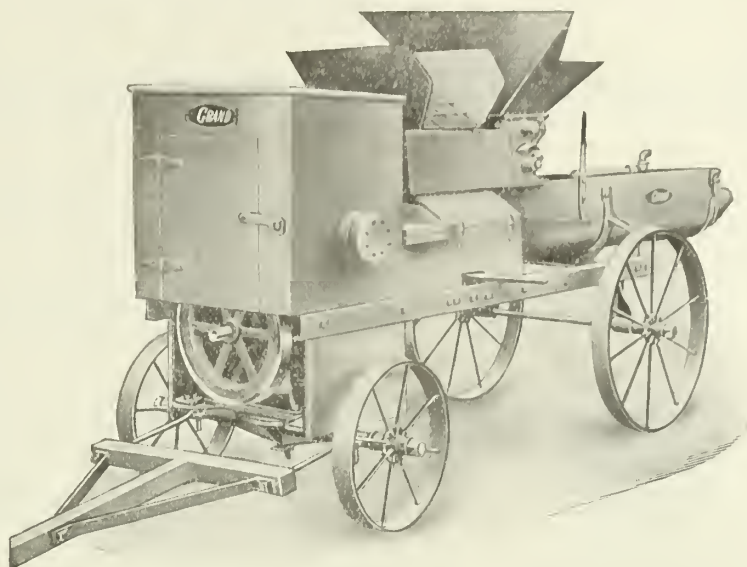
New York



Accuracy of Proportions and Thoroughness of Mixture

Are the essential points to look out for in a continuous concrete mixer. There is no question that a continuous mixer is most economical, the most satisfactory all round, if you can be sure that the materials enter the mixing trough in the right proportions, uniformly, and that they are given a thorough mix before being discharged.

These two points are amply taken care of in the Grand Mixers, the smallest size of which is shown here.



The Baby Grand CONCRETE MIXER

"Not a Piano, but it Runs Like One"

This is a two-hopper machine which proportions and feeds the materials with unvarying accuracy. It mixes them thoroughly in a dry state and then gives them a thorough mix after the water has been admitted.

Built of best grade iron and steel. Run by a $2\frac{1}{2}$ H. P. gasoline engine.

Mounted on sturdy, wide tired truck. Easily portable. The ideal machine for work on bridges, pavements, sidewalks, etc., where the mixer must be moved often.

We guarantee the machine to do all we claim for it. The price of the Baby Grand is low but not so low as to cheapen the equipment. Grand Mixers are built in larger sizes also. Write for complete catalog.

Hall-Holmes Mfg. Co., 228 Oak Street
Jackson, Michigan



The Hartwick "The Two Trough Mixer"

We also manufacture the Hartwick Continuous Mixer, a machine which has been on the market for years and has always made good. Used by hundreds of concrete contractors. The double mixing trough insures a thorough mix and a large capacity.

Low charging hoppers. Low power requirement. Engine housed in a dust-proof hood, as shown. Write for catalog.

*The Standard by which all
other makes are measured*



It's the cement that makes the Concrete

GOOD concrete cannot be made with an inferior cement. When you buy anything for yourself, you want the best, because the best is always the cheapest in the end. It's just so with cement, and when the Isthmian Canal Commission bought 4,500,000 barrels of

ATLAS
PORTLAND CEMENT

for the construction of the six enormous double Locks and Gatun Dam on the Panama Canal, they took into consideration the **Quality, Strength and Uniformity** of our product.

*Atlas has the quality that is essential
where the highest quality is required.*

ATLAS-WHITE

is a true Portland Cement, pure white and Non-Staining. It is used with equal success for exterior and interior work.

Send for Circulars Descriptive of Books on Concrete.

The ATLAS PORTLAND CEMENT Co.

Dept F 30 Broad St. N. Y.
Morris Bldg. Philadelphia, Pa.
Corn Exchange Bank Building,
Chicago, Ill.

Productive capacity
over 50,000 bbls.
per day—the largest
in the world

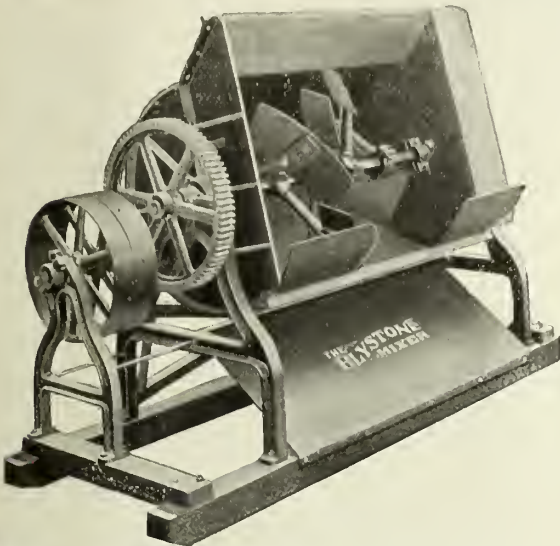


RESIDENCE AT WOODMERE, LONG ISLAND, N. Y.

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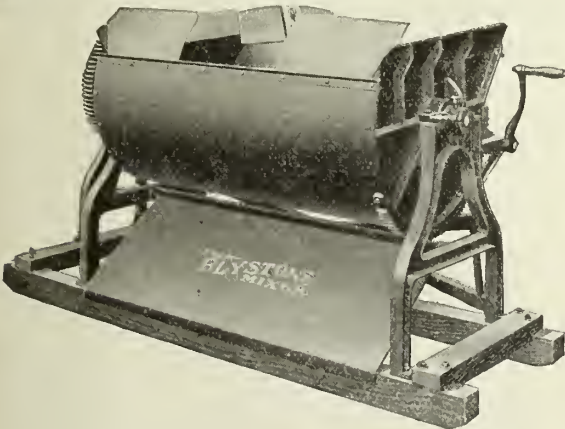


—when you buy a Blystone mixer you buy no frills, no fancy-work



Blystone Skid Mixer for Block Plants

No hoist, no charging hopper, no rickety discharge paraphernalia—just a plain, simple mixer that will do the work required. The price is low.



Three Turns of the Crank Dump the Mixer

Not a superfluous casting on this machine. We sell this mixer at a low price because we have eliminated useless and expensive attachments.



Blystone Mixer on Trucks.

Power attached. Simple, compact, solidly built. Try it on your sidewalk work.

The Blystone Batch Mixer was designed to mix a large volume of concrete and mix it well, at the lowest cost. It has none of the cumbersome, unwieldy loading and dumping devices that cost you money, eat up power, take up space and add nothing to the quality or volume of your concrete.

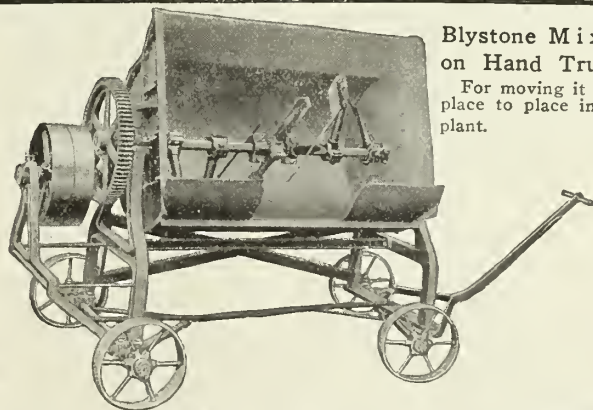
FOR BLOCK, BRICK AND TILE PLANTS our skid mixer is the most economical machine you can buy. Mixes concrete actually cheaper than you can mix it by hand—and much better.

It is low enough to be easily charged—a low platform enables you to dump materials direct from barrows. The plowing blades cut and turn and churn the materials until every piece of stone or gravel is evenly coated with uniform sand-cement mortar.

The mixer is charged while it is working. It is discharged by turning the crank, without stopping the mixing operation—the plows scoop out the entire batch.

FOR SIDEWALKS, PAVING AND GENERAL CONSTRUCTION our mounted mixer, with power attached, has all the advantages that the skid mixer has. It occupies little room—mix can be dumped directly into the forms.

When you buy a mixer, figure on what you are paying for. Don't buy a lot of attachments that add to the cost of the machine without adding one cent to its actual working value.



Blystone Mixer on Hand Trucks

For moving it from place to place in the plant.

WRITE FOR THIS CATALOGUE

It describes the Blystone Batch Mixer in detail. It contains valuable mixing data. Get a copy before you buy any mixer.

Blystone Machinery Co.

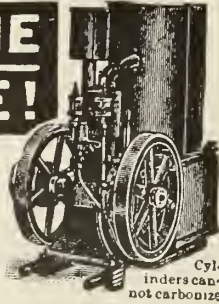
50 Venango St.,
CAMBRIDGE SPRINGS, PA.

SEE THE BLYSTONE BATCH MIXER AT THE NEW YORK, OMAHA, CHICAGO AND KANSAS CITY CEMENT SHOWS

In writing Advertisers please mention CONCRETE.

Use KEROSENE Engine FREE!

Set this engine up in your plant and use it 15 days on your mixer, tile machine, block press, pump or other equipment. Try it out. If it makes good, buy it. If you don't like it, send it back. Don't burn gasoline when you can get an engine that uses cheaper fuel—lamp kerosene, alcohol, benzine or paraffin—like the



Cyl-
inders can-
not carbonize

AMAZING "DETROIT"

The "DETROIT" is the only engine that handles coal oil successfully. Starts without cranking. Basic patent—only three moving parts—no cams—no sprockets—no gears—no valves—the utmost in simplicity, power and strength. Mounted on skids. All sizes 2 to 20 h. p., in stock ready to ship. Complete engine tested just before crating. Comes all ready to run. Prices (stripped) \$29.50 up. Guaranteed for five years. Warranted to develop more than rated horsepower. Ask about 15-trial offer.

Detroit Engine Works, 535 Bellevue Avenue, Detroit, Mich.

Success Sewer Pipe Molds



are the simplest, most easily handled molds on the market for drain tile and sewer pipe. Our molds are made for tongue-and-groove pipe bell end and plain. One of our special types permits the use of the

Wet Process.

Concrete is poured wet into the molds, making tile of great density and strength.

Write for free booklet on concrete pipe manufacture. It's free.

Address

GROH BROS.

228 S. Morton St. E.

Kendallville, Ind.

Mr. Builder
or Mechanic

TRY THE

Master Slide Rule

shown in the picture and at the bottom of this space.



This shows the Master Slide Rule in use for inside measurements. It shows exact dimensions (where indicated by pencil) without figuring or calculation. No guess-work.

The only practical rule for inside measuring of windows, doors, etc., for you can get the absolutely accurate measurements instantly.

Five and six foot rules opened or closed in two movements. Rigidly built for hard usage.

MASTER SLIDE RULE can be used for all measuring purposes, as it is laid out on one side for inside measurement and on reverse side as an ordinary rule; and is particularly valuable for quick measuring of walls and ceilings.

SPECIAL We will send prepaid a 4', 5' or 6' rule upon receipt of 15 cents per linear foot and name of nearest hardware dealer. Send for one or more!



Dahl Mfg. Company

1 East 42nd St., New York



Agents Wanted.

Pat. Dec. 13, 1910



Using Zeiser Tie and Dividing Plates with Wood Side Rails.
Grant City, S. I., July 31, 1911.

Zeiser Bros., Berwick, Pa.

Gentlemen:—The forms which we purchased from you earlier in the season are giving excellent satisfaction and we consider them an absolute necessity for concrete sidewalk work. A number of makes and styles of forms are being used by various contractors in our district, but all have some fault or disadvantage except yours, which WE have found entirely satisfactory.

Very truly yours,

DIAMOND CONCRETE WORKS,
Per Frank K. Galloway.

Messrs. Zeiser Bros., Berwick, Pa.

Gentlemen:—I received the new style dividing plates and wish to thank you for your prompt shipment. As you are aware, I am now using your steel side rails and dividing plates and would not care to lay walks without this outfit. These rails and ties, alone, have brought me some twenty odd jobs this summer, and the people in this section do not seem to care to have the old style rails used at any cost.

Aug. 31, 1911.
Centre Hall, Pa.

W. GROSS MINGLE.



Section of Zeiser All Steel Forms.

Sidewalk Construction

MADE EASIER, BETTER and
MORE PROFITABLE

Mr. Sidewalk Contractor—

Do you want to be the leading sidewalk man of your town or city?

If you do, you must be able to do the best work for the least money.

In order to do this you must have modern equipment. You must have Forms which can be quickly set up and easily taken down; Forms that can be used over and over again, and will be as good as new at the end of the season; Forms that will make Safe, Sane and Slightly Expansion Joints at every cross joint;

Forms that will insure Perfectly Straight Work, and reduce labor cost.

ZEISER TIE AND DIVIDING PLATES for use on wood side-rails, or ZEISER ALL STEEL SIDEWALK FORMS will fill your requirements. They will lighten your burdens, and put money in your pocket.

There are more ZEISER FORMS in use and being sold every day than of all others on the market put together.

There Is a Reason

Write for information and prices. Don't delay. Do it today.

ZEISER BROS.

1318 E. Eighth St.

BERWICK, PA.

—THE—
CURRY TYER



For
 Binding
 Reinforcing
 Rods
 in
 Concrete
 Construction

=====
Rapid
Secure
Uniform



This method of binding rods gives a uniform number of twists to the tie, drawing it to a uniform tightness and making it absolutely secure. Its speed of operation in the hands of the cheapest laborer is two to three times faster than with pliers or other methods. Can be learned in five minutes' practice. Its use is therefore far more practical and economical.



Guarantees
 full speed in cold
 weather.

Eliminates the
 inaccurate human
 element.

Tools are not
 lost as with
 pliers.

=====
 Booth 219
 New York Cement Show

=====
 Descriptive Booklet
 G. and references from



CLIFFORD L. MILLER & CO.

(Sole Agents)

110 East 23rd St.,

NEW YORK, U. S. A.

Experienced Tile Men

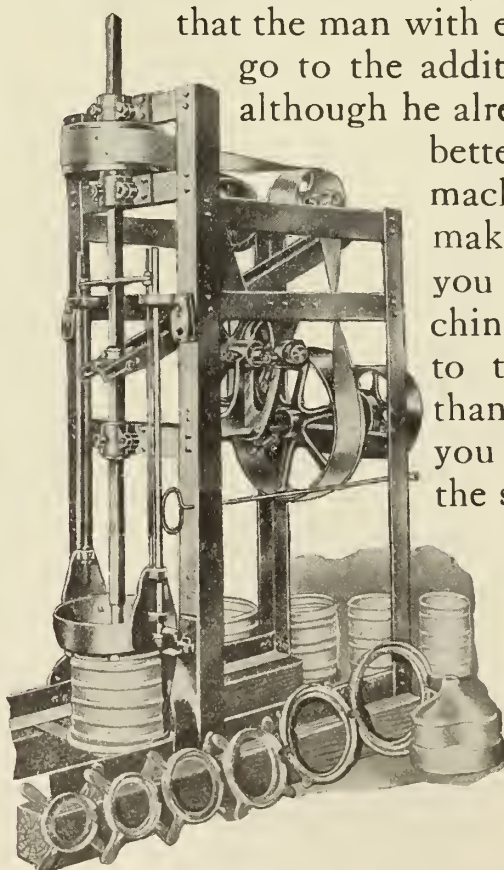
who are already in the cement tile business and have tile machines of other makes are buying more

McCRACKEN TILE MACHINES

than we are selling to customers who are just starting in the business. Now the question for you to decide is this: Are you a better judge of what a successful tile machine should be than the fellow who has had the experience?

Twenty-seven of the last 49 McCracken Tile Machines we have sold were sold to people who already had other makes of machines.

This Proves Two Things



that the man with experience can see where it pays him to go to the additional expense of buying a McCracken, although he already has a machine, and that you are a better prospective customer for a McCracken machine after you have bought any other make of machine and used it for a time than you are right now before you buy any machine. Now if we are selling more machines to the people who already have machines than we are to new customers, it might pay you to buy a McCracken machine right on the start and have to buy but once.

Don't fail to see our Machine
in operation at Booth 117 at
the Chicago Cement Show

Write for Our Proposition

Sioux City Cement Machinery Co., West Fourth & Perry Sts.,
Sioux City, Ia.

NOW READY

The Technical Press Index

This Index covers the entire field of engineering science, listing all articles of permanent value appearing in the technical periodicals of America and Europe during the period mentioned above, classified under

ARCHITECTURE
AUTOMOBILES AND AERIAL NAVIGATION
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ELECTRICAL ENGINEERING
INDUSTRIAL TECHNOLOGY
MARINE ENGINEERING
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METALLURGY
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RAILROAD ENGINEERING

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1. Full title and name of author.
2. Name and date of publication.
3. Approximate number of words in article.
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Altogether, nearly 200 different periodicals are indexed, including, besides all those of importance of the United States and Canada, 32 English, 31 German, French and other foreign, and 12 American Technical Society publications.

The up-to-date progressive engineer—the man who is most vitally interested in the published records of engineering progress—who is most concerned in new developments in his own specialty and its many allied interests—who is too busy to spend ALL his time reading—is the man to whom the Technical Press Index appeals; he cannot afford to overlook the advantages it offers of keeping himself in touch with everything of real importance to him.

Cloth binding; 7½ x 10 inches; listing over 11,000 articles of permanent value.

PRICE, \$3.00, NET.

Supply Limited. No Second Printing. ORDER NOW, or send for Further Details.

The Technical Literature Company
(Publishers of The Engineering Digest)
St. Paul Building NEW YORK

"Satisfactory Result Bringing"

The above is quoted from a letter received from a large firm for whom we prepared

Advertising Copy

We are furnishing this kind of advertisements for others; why not

For You?

Write us what you desire to advertise and we will submit details.

To-day is the time to write

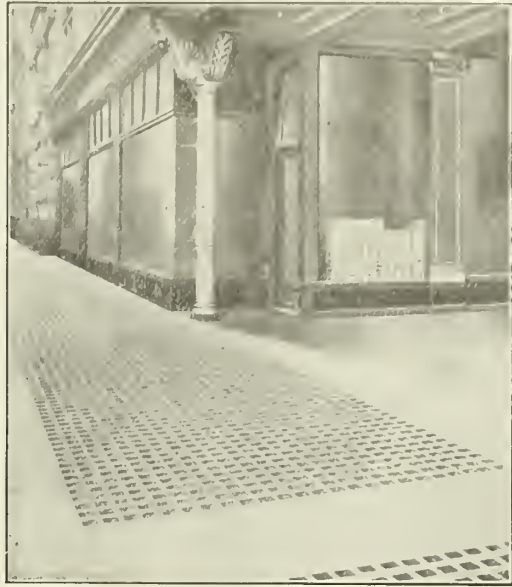
THE

Producing Publicity Designers

Twelve West Thirty-first Street
NEW YORK

REFERENCES.

H. E. J. PORTER, Industrial Engineer.
J. A. MacINTYRE, Adv. Mgr. C. W. Hunt Co.
W. B. GREEN, Adv. Mgr. The Billings & Spencer Co.
H. H. KRESS, Adv. Mgr. The Jeffrey Mfg. Co.



Raydiant Sidewalks Lights at Mint Arcade, Philadelphia, Pa. Architects and Builders, Wm. Steele & Sons Co.

BERGER'S *Raydiant* SIDEWALK LIGHTS

The Most Efficient System of Sidewalk and Floor Lights

When you install Sidewalk or Floor Lights you naturally want to obtain from them the greatest possible amount of light.

Raydiant Lights have the largest light area per square foot of surface consistent with maximum strength.

But this is just one of many points in which Berger's Raydiant Sidewalk Lights excel. They are simple in construction and tremendously strong.

"Raydiant" is a catalogue that will interest you—it gives tables of safe loads. Write nearest branch for your copy to-day.

The Berger Mfg Co., Canton, Ohio

Philadelphia, New York, Boston, Chicago,
St. Louis, Minneapolis, San Francisco, Atlanta.

Also manufacturers of Concrete Sidewalk Forms, Rib-Truss Plates, Ferro-Lithic Reinforcement Plates, Multiplex Plates, Metal Lath, Metal Lumber, Black, Galvanized and Painted Roofings, etc.

SCRAP THE REST—USE THE BEST

HERE IT IS

If You are One of These

Who Want to Improve Your Factory and Make

REAL CONCRETE STONE

At Less Cost than Blocks You Now Make. Be the Only Concrete Man of Your Locality. Have a Real Business and Be Proud of It.

WRITE US NOW FOR OUR PROPOSITION

Test of our Concrete Stone, 3,500 lbs. per sq. in., 4% Absorption. Mixture 8 to 1.

How Does Yours Compare?

Send us a sample. We will test it.

Which is your choice?

Which would you rather sell?

Which would you rather use?

YOU KNOW

Which will stand up?

Which will hold your customer?

Which will weaken his confidence?

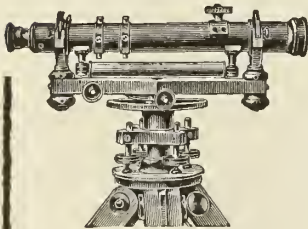
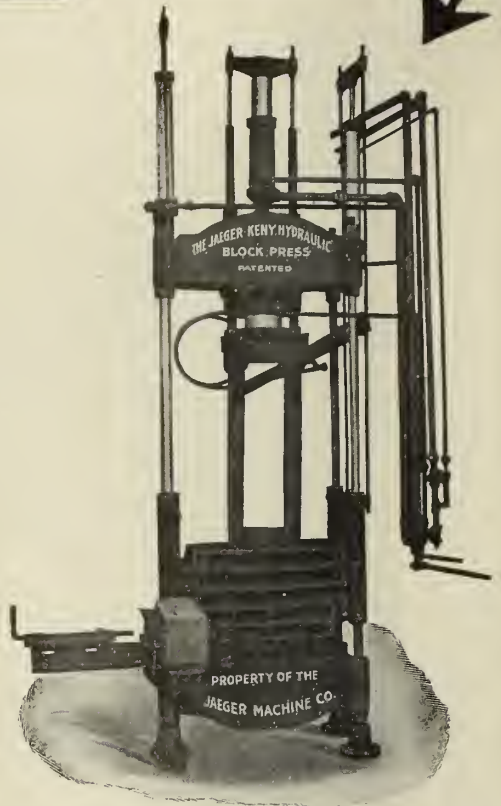
WE KNOW

It is not a Little Question—But a Big One.

ARE YOU GOING TO CONTINUE IN THE BUSINESS?

See our exhibit at New York Cement Show, spaces 273-274; at Chicago, spaces 201-202; at Kansas City, space 7.

Jaeger Machine Company
COLUMBUS, OHIO.



The illustration shows our Architect's and Builder's Level, for leveling walls, laying out angles, grading streets, sewers, drains, sidewalks, etc. Ask for Circular 25.

LEVELS

The purchase of a level or a transit isn't an expense, it's an investment. Many times, by avoiding errors, you can save the cost of the instrument on one job. Mistakes are expensive.

Engineers, contractors, architects and builders who use Kolesch levels have error-proof work.

KOLESCH & CO.

Surveying Instrument Makers,
138 Fulton St.

Established 1885
NEW YORK

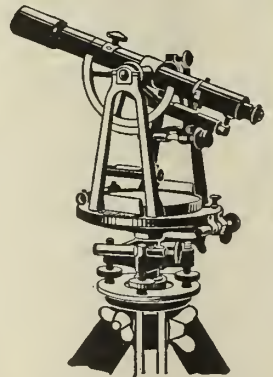
BUFF

The Buff is old in name, but the most modern and up-to-date in construction. It is made by experts for the use of experts.

Send for Catalogue 32

Buff & Buff Co.

Jamaica Plain Station
BOSTON, - - MASS



For Extra Strong Concrete Construction

such as COLUMNS AND POSTS, GIRDERS, LINTELS, AND ARCHES, CEILINGS AND FLOORS, ETC.

for all concrete, re-inforced or otherwise, where great strength is required.

Use our **Crushed Granite** all sizes.

Compression and tensile strength five times greater than limestone concrete or concrete made of any other aggregate.

BEST MATERIAL ON THE MARKET FOR MACADAM ROAD

For Wearing Surface of Cement Roads, Factory Floors, Facing for Cement Blocks or Monolithic Concrete, use our

GRANITE SCREENINGS

We are also Miners and Shippers of
CONCRETE SAND AND GRAVEL

Michigan Portland Cement Paving Co.

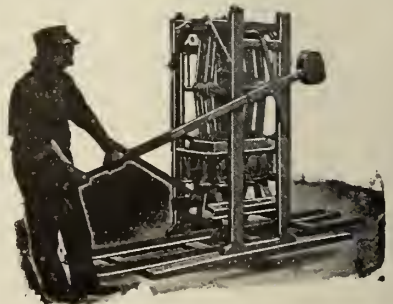
Plant and Pits at Clarkston, Mich. Phones: Main 1030;
Office: 301 Penohscot Bldg., Detroit, Mich. City 1030.

Somers Pressure Block Machine

This is a machine that molds concrete blocks under heavy pressure—the concrete is pressed into a block that defies competition. Somers blocks have passed the severest tests successfully.

WET MIXTURE—

The only true concrete is made of coarse materials, mixed wet. Get a machine that will handle such a mixture without sticking. We have just issued a book that tells just how such blocks are made. Write us for a copy.



Somers Bros.

Box A, Urbana, Ill.

SAND SIFTING MACHINE

For block makers, sidewalk men, plasterers, masons and general contractors.

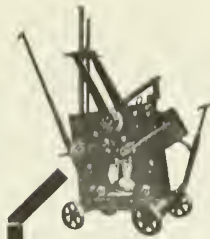
Sifts sand, wet or dry.

Both hand and power machines.

Write for prices.

**BURKE-
BRATRUD
CO.**

ROSWELL, S. D.



Cut your steel right on the job.

WIENER
MACHINERY CO.
Dey and Church Sts.,
New York City.

"S & N" Portable Hand Power

Beam Shears

A Structural Shop on Wheels

Shear—Beams, Channels, Angles, Tees
Punch—Beams, Webs
Cut—Rounds, Squares, Flats
Cope—Webs and Flanges at One Stroke

Standard and Bethlehem Beams

Made of Steel Plates and Forgings.
Fully Guaranteed.

Four Sizes—From 3 in. 18 lbs. to 20 in. 90 lbs. beams.

Bar Cutters—Bar Benders.
Punches and Shears for Every Requirement

Write for illustrated description.

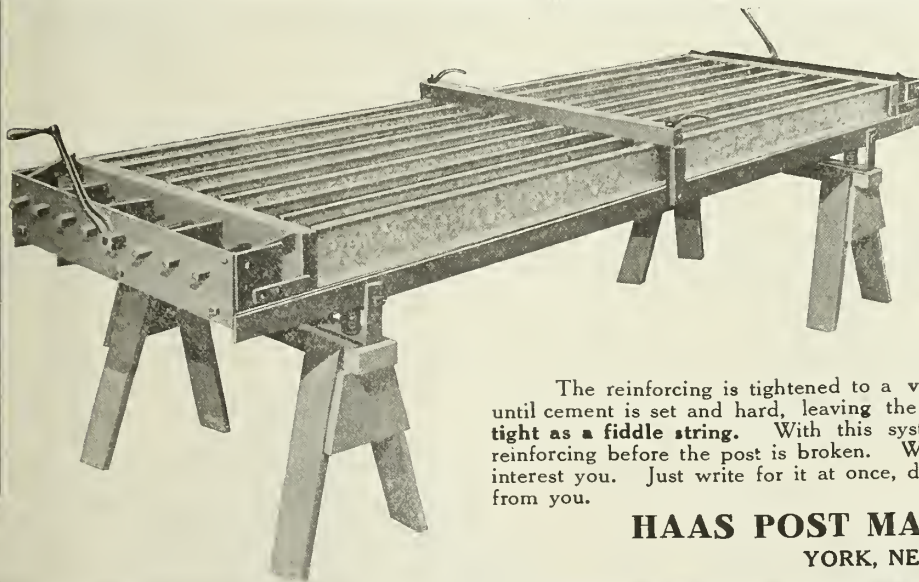
ADVERTISERS' NOTICE

Changes in copy and discontinuance orders for February number of CONCRETE must reach this office not later than January 15.

New advertising can be accepted as late as February 5.

CONCRETE PUBLISHING CO.

Detroit, Mich.



THE
"HAAS"
Post Machine

A NEW SYSTEM
Tightens the Reinforcing

The reinforcing is tightened to a very high tension which is held until cement is set and hard, leaving the reinforcing in the finished post tight as a fiddle string. With this system you get the benefit of your reinforcing before the post is broken. We have a proposition that will interest you. Just write for it at once, don't put it off. We want to hear from you.

HAAS POST MACHINE CO.,
YORK, NEBR.

HESS MEDICINE SANITARY LOCKER

The Only Modern, Sanitary
STEEL Medicine Cabinet

or locker, finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimmings. Steel or glass shelves.

Costs Less Than Wood

Never warps, shrinks, nor swells. Dust and vermin proof, easily cleaned.

Should Be in Every Bath Room

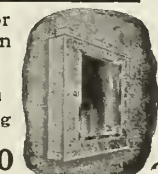
The Recessed Steel Medicine Cabinet

For styles—four sizes. To recess in wall or to hang outside. Send for illustrated circular.

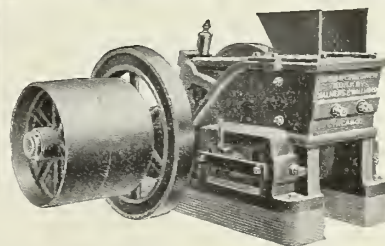
HESS, 902L Tacoma Bldg. CHICAGO

Makers of Steel Furnaces.

Free Booklet.



The Outside Steel Cabinet



THE ONLY
CRUSHER
FOR USE IN
Concrete Work

Occupies small amount of space, small amount power required, costs little for repairs, produces a uniform product

Ask for Catalogue A 12

CHALMERS & WILLIAMS, Inc.

General Office and Works, Chicago Heights, Ill.

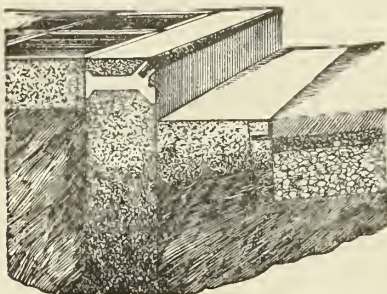
WAINWRIGHT GALVANIZED STEEL CORNER BAR

FOR PROTECTING EDGES OF CONCRETE CURBS, STEPS, COLUMNS, ETC.

"Wainwright
Patents."

March 9, 1897
Nov. 22, 1898
May 5, 1903
March 26, 1907
August 29, 1907
August 2, 1910

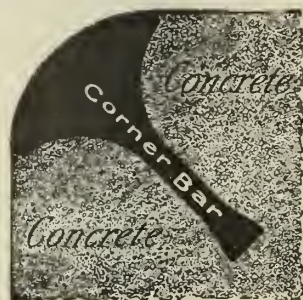
This bar is SELF-ANCHORING, the DOVETAILED WEB holding it firmly in place EVERY INCH OF ITS LENGTH, requiring no clips, bolts or wires at intervals, allowing buckling or expansion, causing loosening of curved plates or other devices, which form no permanent Protection to the curb. This bar presents a RESISTING DEPTH of nearly AN INCH OF SOLID STEEL, at any possible point of impact, as compared with other devices using seldom more than one-eighth of an inch resisting surface. It has a record of ten years use without failure.



This bar has been in public use for more than ten years as the main feature of the

WAINWRIGHT STEEL-BOUND CONCRETE CURB

ABSOLUTELY NON-BREAKABLE
CHEAPER THAN GRANITE



GALVANIZED STEEL CORNER BAR prevents Chipping or Breaking on Edges.

MECHANICALLY PERFECT AND UNEQUALLED FOR CURVED CORNERS.

THE BEST IN THE WORLD, Over Three Million Feet in Use in More Than Three Hundred Cities

THIS CURB WILL STAND HARDER USE AND LAST TEN TIMES AS LONG AS PLAIN CONCRETE CURBING

CONTRACTORS can make money by laying this curb. CITY ENGINEERS can save money by specifying it. ARCHITECTS are invited to read pages 242 and 243 "Sweet's Index."

METAL PARTS FOR SALE. SEND FOR COPYRIGHTED BOOKLET No. 2.

STEEL PROTECTED CONCRETE CO., Real Estate Trust Bldg. PHILADELPHIA, PA.

THE PERFECT



BRICK MACHINE

The Brick Machine that pleases everybody. The 1912 Model with its valuable improvements has no equal or comparison in Value, in Simplicity, Durability or Speed. Investigate the make-up of the PERFECT before purchasing any other.

Write for Catalogue and Prices.

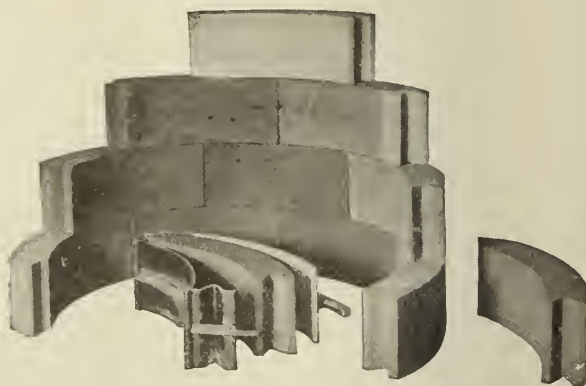
C. S. WERT

Kendallville, Ind.

THE PERFECT CISTERN AND SILO MOLDS

ARE USED IN ALL PARTS OF THE WORLD

OUR MOLDS are the BEST and CHEAPEST ever offered to the Public

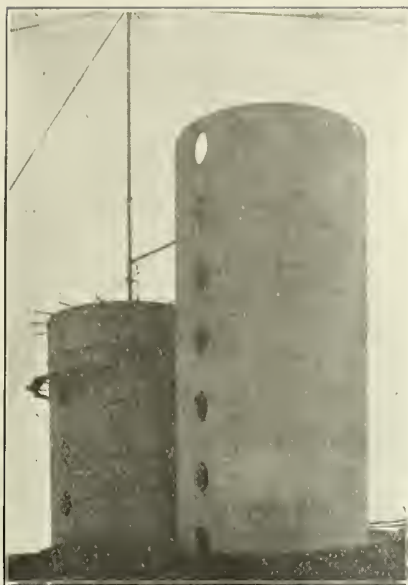


The Perfect Well, Cistern and Silo Mold

THESE Well, Cistern and Silo Molds are among the most useful articles a concrete products manufacturer can have about his plant. These Molds as well as the PERFECT Brick Machine will be in operation daily at the N. Y. Cement Show, as well as at Chicago, Kansas City and Omaha, Nebr. Come and see the Brick Machine that leads all others. Convince yourself and be your own judge in selecting your Concrete Brick Machine.

Write for the 1912 Catalogue, address

C. S. WERT, Kendallville, Ind.



— OF COURSE —

Mr. Contractor, you are in business for profit. You are interested in increased profits, just as surely. If, in your circular monolithic construction, you want to reduce your construction costs—then you are interested in the POLK SYSTEM (Pat.).

IF you eliminate most of the scaffolding—

IF you eliminate expensive, laborious wood forms—

IF you eliminate danger of strains and stresses on green walls—

IF you practically eliminate form wear—

IF you eliminate the chance of dockage from leaning, crooked or rough structures—

WE SAY—if you can do these things—

THEN haven't you increased your profits?

UNDOUBTEDLY.

Address us for particulars or meet us at Chicago Cement Show, February, 1912. Remember it's the POLK SYSTEM.

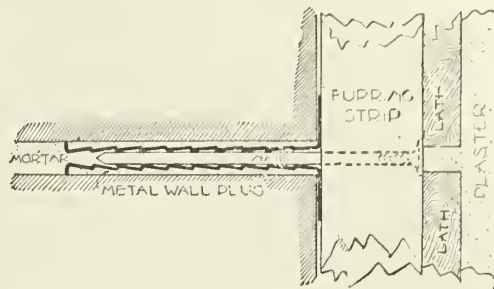
POLK-GENUNG-POLK COMPANY (Inc.)

Fort Branch, Indiana.

Just the 'Thing'

For

Securing Interior Finish



Furring Out on Brick or Concrete

Use the Standard

RUTTY METAL WALL PLUG

Send for Cement Booklet No. 94

J. B. Prescott & Son, Mfrs.

Dept. C

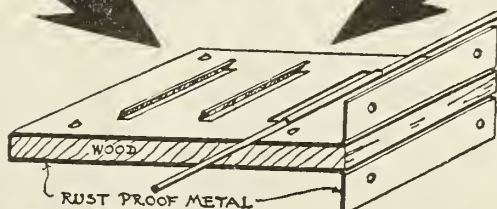
Agencies All Cities.

Webster, Mass.

**It will do your heart good to see
the men nail up the work
when this plug
is used.**

**I am
used by
large build-
ers all over the
United States.
Why? Because
I save them
25% in Mechan-
ical labor and
give a bet-
ter job
too.**

Let us tell you
about it. Agents
all over the U.S.



"The Common Sense Wall Plug"

**If not
now, you
will---use this
plug. Because
there's dollars
running out of
your pocket,
and this plug
will stop that
waste of
money.**

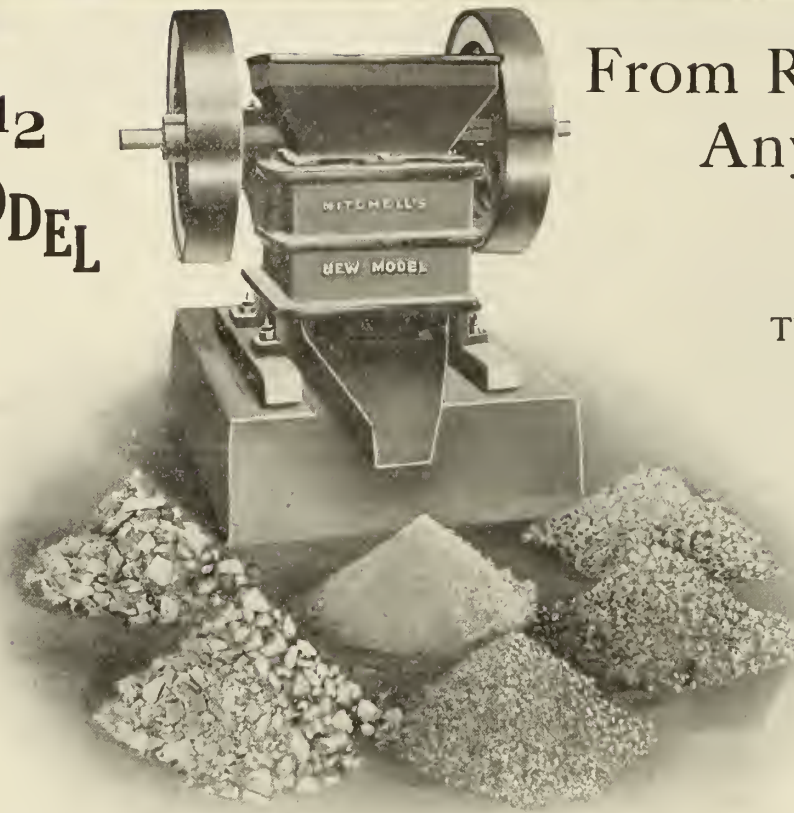
**When nail-
ing time comes
around, have me there
and the men won't swear.**

SAMPLE FREE

THE M. O. WICKS MFG. CO., 48 NASSAU AVENUE GLEN COVE, N.Y.

In writing Advertisers please mention CONCRETE.

1912
MODEL



From Rock to Any One of These Sizes

The "Mitchell" Improved Crushers

Are the only crushers that will take rock or ore and reduce 3-inch pieces down to sand in one operation — like sample illustrated under the machine. They are the only crushers you can adjust instantly, getting any size you want. This cut made from our crusher in actual use illustrates what we GUARANTEE; is not this convincing?

WE REFUND YOUR MONEY
IF IT WILL NOT DELIVER
THE GOODS.

"The Best by Test"

If Anyone Tells You

That they are building, selling or using a crusher that is better than a "MITCHELL" send for our book called

"Crusher Facts"

Compare this crusher with any other machine at any price and judge for yourself. After you have read our catalog, go to our nearest dealer or customer and see the machine —convince yourself that the "Mitchell Improved Crushers" are all we claim for them—and more.

"Mitchell" Crushers

Are made in 15 sizes and are placed with several thousand satisfied users. Every crusher is guaranteed to crush rock or ore as illustrated. Send for our new 1912 catalog today and we will send you the name of our dealer or nearest customer to you who has installed our machine.

AS LOW

AS \$30.00

Canadian Factory
Mitchell Crusher Mfg. Co. L't'd.
Office and Works
Bathurst and Niagara Streets
Toronto, Canada

ADDRESS **Eureka Stone & Ore Crusher Co.**

Cedar Rapids, Iowa

No. 1-3 B. Ave.

"Anybody Can Run a Mitchell Crusher"

In writing Advertisers please mention CONCRETE.



Mr. Reader:--It will pay you to watch this page from month to month

ADVERTISERS

To manufacturers of small specialties not profitably advertised in big space and manufacturers of heavy equipment who want to "feel out" this field we recommend the use of advertising space on this page. Advertising space here is given distinctive position, and will bring results. This rate is low because no large space is sold; you can keep your proposition before our readers the year 'round at little expense. No advertisement accepted to occupy more than 3 inches, single column, on this page. Ask for rates.

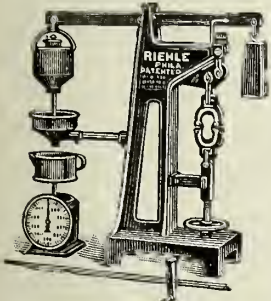
Mixers and Brick Machines

Write us for our catalog and new plan of selling mixers and brick machines at rock bottom prices.

Wettlaufer Bros.
Buffalo, N. Y.

BAICH MIXERS

Best machines for block plant work. High capacity, low price.
CENTURY CEMENT MACH. CO.
285-295 St. Paul St.
Rochester, - - N. Y.



RIEHLE AUTOMATIC CEMENT TESTING MACHINE

Pat. Nov. 8, 1904

Solid Back Grip

Pat. Sept. 11, 1901
Pat. June 10, 1904

Testing Outfit

1424 North 9th St., Philadelphia, Pa.

Carry Your Materials By Machinery

For Sale—Complete equipment for handling materials in concrete plant. Cement unloaded from cars automatically, sand and gravel carried to bins in cup elevators. Materials fed from bins to mixer on belts. This is not second-hand equipment.

Cut your labor cost by handling your materials automatically. For details address

AUTOMATIC,

care of
Concrete Pub. Co., Detroit, Mich.

Ornamental Molds

FOR CASTING CONCRETE

**Porch Columns, Balusters
Caps, Lawn Vases, Etc.**

Write for catalog of molds, showing the mold and the product.

Architectural Mold Co.

1117 E. Warren Ave., DETROIT, MICH.

CHARLES E. SIMS Consulting Engineer

Worthington, Minnesota.

Cement drain tile factories designed. Detailed plans, specifications and cost for building and equipment. Proposed sites investigated.

REICHERT METAL FORMS

Save 3 Cents Per Square Foot
on Concrete Walls.

Reichert Manufacturing Co.
MILWAUKEE, WIS.

Crushed Granite

Screened to size, for concrete or artificial stone. The strongest and most durable aggregate. Two colors, gray or white. Woodbury Gray Granite is mouse-gray in shade. Hardwick White Granite is the whitest granite known. In carlots, at a low price.

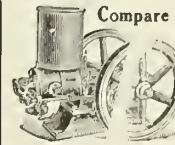
Let us quote you also on granite sills or trim for use with concrete work. Quick delivery.

WOODBURY GRANITE CO.,
Hardwick, Vermont.

Sanitoid Flooring

A Composition Mineral Substance laid in monolithic form and producing a fireproof, waterproof, permanent, and sanitary flooring base, or wainscot. Methods of installing SANITOID are simple and easily learned. Can be sold at good profits for a hundred different uses. Write for material costs and territory, rights today.

The Sanitoid Products Co.
701 Brunson Bldg. COLUMBUS, O.



Compare This Engine With Others

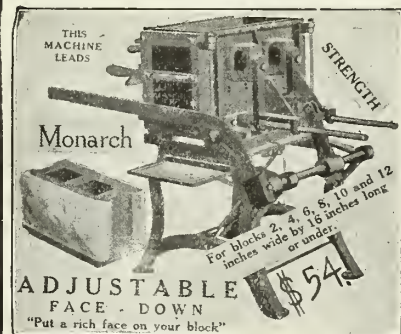
with reference to the amount of gasoline used and the amount of work done, then if our engine isn't ahead send it back; we pay freight both ways; you can not know highest quality until you know our engine.

Chapman Engine Shop,
Marcellus, Mich.

Barten Process and Machine for making Concrete Building Blocks of a Slushy, Muddy Mix, also of a Moist Mix

The strongest, waterproof perfect blocks. No curing expense. No pallets. Also makes drain tile, hollow blocks, sidewalk paving blocks and hollow wall. One man operates as fast as you shovel concrete into machine. Weighs about 30 lbs. Make blocks anywhere, even on a roof or in a cellar. Carries like a suit case. Handy as a trowel. Makes blocks any length, 2 to 24 inches. Any thickness, 1 to 4 inches. Adjustable to do any of the above in one minute. Set of beautiful oak leaf and acorn face and end plates also set of round edge panel face plates with each machine. Face down method. Malleable iron machine, directions and license now \$35. Price will advance April 1st.

W. H. BARTEN, Gordon, Nebraska



Get catalog No. 8 for discounts. 6 machines in one, over 2000 in use. Lever operating cores. Latest designs. Quickest adjusted. Makes everything. Investigate it.

Remember the SYSTEMATIC MIXER still leads, 6 styles. Ask about it, see cut on page 102

CEMENT MACHINERY CO.
JACKSON, MICH.

COMPOSITION FACE-PLATE

are what produce those fine rock-faces on Hobbs block. Sold only with the Hobbs Concrete Block Machine.

See advertisement on page 89 of this issue.

Hobbs Concrete Mchy. Co.
802 Ford Building, Detroit, Mich.

Liner Advertisements

Rates for these columns: Three cents per word per insertion, payable in advance. Copy can be accepted as late as the first of any month for that issue.

FOR SALE—Concrete Machinery

WE will send you our Concrete Roofing Machine and Artificial Marble literature, on receipt of a postal. Grumman & Lawhead Co., Zanesville, Ohio.

FOR SALE—Stone Crusher; capacity 8 to 10 tons daily; in good condition. Also 1 Pettyjohn Post Machine and 1 Elposco Wire Tie Block Machine. H. H. Bockstadter, Sidney, Nebr.

FOR SALE—1 Diamond Cement Shingle Machine, complete with 400 steel pallets; only been used four months. Write for full particulars. Defiance Cement Works, Defiance, Ohio.

FOR SALE at bargain—1 Anchor concrete machine with full equipment and 400 pallets. Box 87, Milford, Iowa.

FOR SALE—Write Wettlaufer Bros., Buffalo, N. Y., for their Catalog with new plan of selling at bottom prices on Mixers and Brick Machines.

HAVE YOU RECEIVED our famous Catalog "D", the great money saver on Contractors', Cement and Concrete Machinery Mixers, cars, rails, etc. Mailed everywhere. M. Mitskun Co., Detroit, Mich.

MACHINERY WANTED

WANTED—Good second-hand block machine outfit. Hobbs preferred. Address 1114 S. D St., Monmouth, Ill.

WANTED—New or second hand machines to make hollow or solid slabs measuring from 2 to 4 inches thick by 13x18, or near that size.

WANTED—Conveyors to carry sand and gravel; new or good second hand.

WANTED—Good second-hand power or hand mixer. Nathan Levy, 75 W. 25th St., Bayonne, N. J.

WANTED—Good second-hand Hatch Mixer. State price and details. C. F. Kleiderer & Son, Henderson, Ky.

WANTED—Good second-hand power mixer, gasoline. Address Early W. Riley, Decatur City, Iowa.

FOR SALE—Miscellaneous

MAKE a Good Block Machine for about fifty cents. Illustrated Directions One Dollar. Have for sale the best brick and block machines cheap. William Barten, Gordon, Nebraska.

THERE is big profit in molding concrete lawn vases. One man using A Rapid Concrete Lawn Vase Mold completes a vase every 15 minutes, at a cost of 22 cents each. Vases sell for \$3.50 to \$15.00 each. Write for Free information today. A. A. Houghton (Foundry Dept.), Northville, Michigan.

BUSINESS OPPORTUNITIES

MANUFACTURER WANTED — Must be reliable—To build and market the quick-selling Roughen Adjustable Street and Road Paving Gauge, on a royalty basis. Now in successful use. Address, only, P. Roughen, Patentee, 213 Amo yrSt., Fond du Lac, Wis.

WANTED—A reputable man (or company) to hold salaried positions in company, to invest capital in same, (absolutely secured), to handle local sales and manufacture on a royalty or co-operative basis, details upon request and satisfactory proof of your ability, reference and financial strength. We manufacture a reinforced concrete telegraph pole, positively invincible, as to practicability, strength, durability and commercial competition. It is fully protected by basic patents. We have the endorsement as well as open orders from hundreds of railroads, traction and service lines, telegraph and telephone companies. Address at once, Standard Cement Pole Co., Dept. D., 150 Nassau Street, New York City.

DEXTER

Portland Cement
THE NEW STANDARD



Sole Agents **SAMUEL H. FRENCH & CO.** Philadelphia

Manufacturers and Contractors

TAKE NOTICE:

We can supply you with information that will obtain new business for you throughout the entire country. We can put you in touch with parties who are planning the erection of new brick, cement, concrete, tile plants, etc. Write us today and we will give you complete information.

UNITED STATES PRESS INFORMATION BUREAU
1309-153 La Salle St., CHICAGO, ILL.

POSITION WANTED. Open for position January 15th, 1912. Man experienced in handling reinforced concrete work, ornamental cast cement stone work, in sand, plaster or glue molds. Best of references. Address Box 84, c/o CONCRETE, Detroit, Mich.

Almost anybody thinks he can lay a concrete sidewalk. That is the reason some concrete sidewalks begin to go to pieces when their life really should have only begun.

YOU know that concrete is a material that must be made of good cement and carefully selected aggregates, proportioned and mixed with intelligence and then finished and cured with caution—YOU know that only good workmanship makes good concrete walks.

You sidewalk contractors should let the men who work for you into the secrets of the niceties in sidewalk building. If your workmen are intelligent in their work, certainly the result is going to redound to your credit and make your business larger and more profitable.

Why not put the knowledge of the best methods into the hands of the men who do the work. The seventh edition of a little pocket-size book, "CONCRETE SIDEWALKS," containing chapters on curbs, gutters, floors and pavements, costs but 35 cents. Buy a book for each of your men—and one for yourself. It will be money in your pocket. Address **CONCRETE PUBLISHING COMPANY**, 97 Fort St. W., Detroit, Mich.

SPRUNK

Engraving Co.



ENGRAVING · DESIGNING ·
JOURNAL BUILDING
DETROIT

FOR SALE—

One Ransome concrete mixer, No. 3. Capacity 30 yds. per hour. This machine is as good as new.

One "BROUGHTON" mixer for cement block or cement brick work. Capacity 1-2 yd., 11 yds. per hour, used very little and practically new.

R. M. BARNETT, Oswego, N. Y.



The U. S. Champion Cement Shingle Machine

Is the only practical machine of its kind on the market. It makes shingles that are strong, waterproof and stormproof. They lock together perfectly on the roof. These shingles have no competition—your market is waiting for you. Buy this machine—you'll find there is big profit in the U. S. Champion Cement Shingles.

Write for our New Catalog.

L. HANSEN & CO. 2035 Penn St. KANSAS CITY, Mo.

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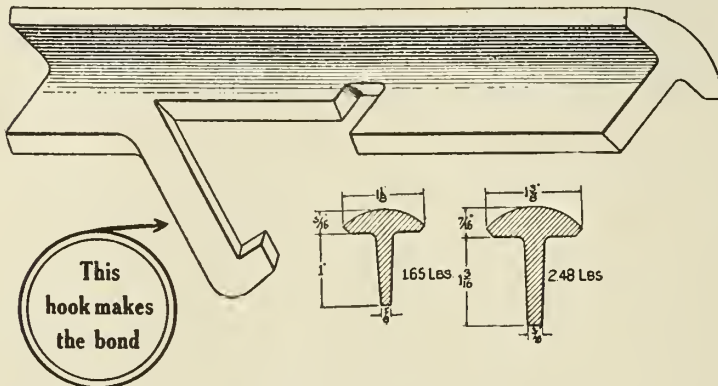
All who contemplate purchasing a concrete mixer, should investigate a "BOLTE." WHY? Because they are the best all purpose mixer for the price on the market. Hundreds are in use giving entire satisfaction.

If in the market for Block or Brick machines, Power Tamper, Gasoline Engine, Sidewalk, Culvert or Bridge Forms, Finishing Tools, Wheelbarrows, Steel Facing or Mortar Box—

Ask for our No. 12 Catalog, stating what you are in need of. Let us quote you Prices and Terms!

THE BOLTE MFG. CO.

Kearney, Nebr.



Protect and Reinforce the Corners of Your Concrete Curbing

Imperial Hook Curb Bar

is a steel member to be embedded when the concrete is poured, forming a permanent protecting edge and acting as a reinforcing member as well.

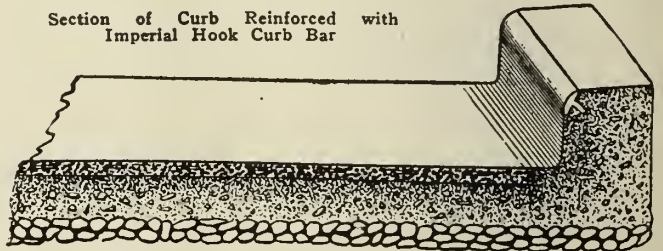
These bars have shear members which bond perfectly with the concrete. Rolled in straight lengths and in curves for street corners. They come in 10 ft. lengths, seven anchors in each length. Write for circulars.

Edward E. Buhler & Co.

MANUFACTURERS
Sales Office: 103 Park Avenue - - - New York City
Factory: Pittsburg, Pa.
Western Agents: Waterhouse, Price Co., San Francisco, Cal.
Louisiana Agents: Standard Paving & Construction Co., 321 Godchaux Bldg., New Orleans, La.

City engineers and contractors who have had trouble with the old sandstone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear.

Section of Curb Reinforced with Imperial Hook Curb Bar



S. & H. STRAIGHT-EDGE LEVEL

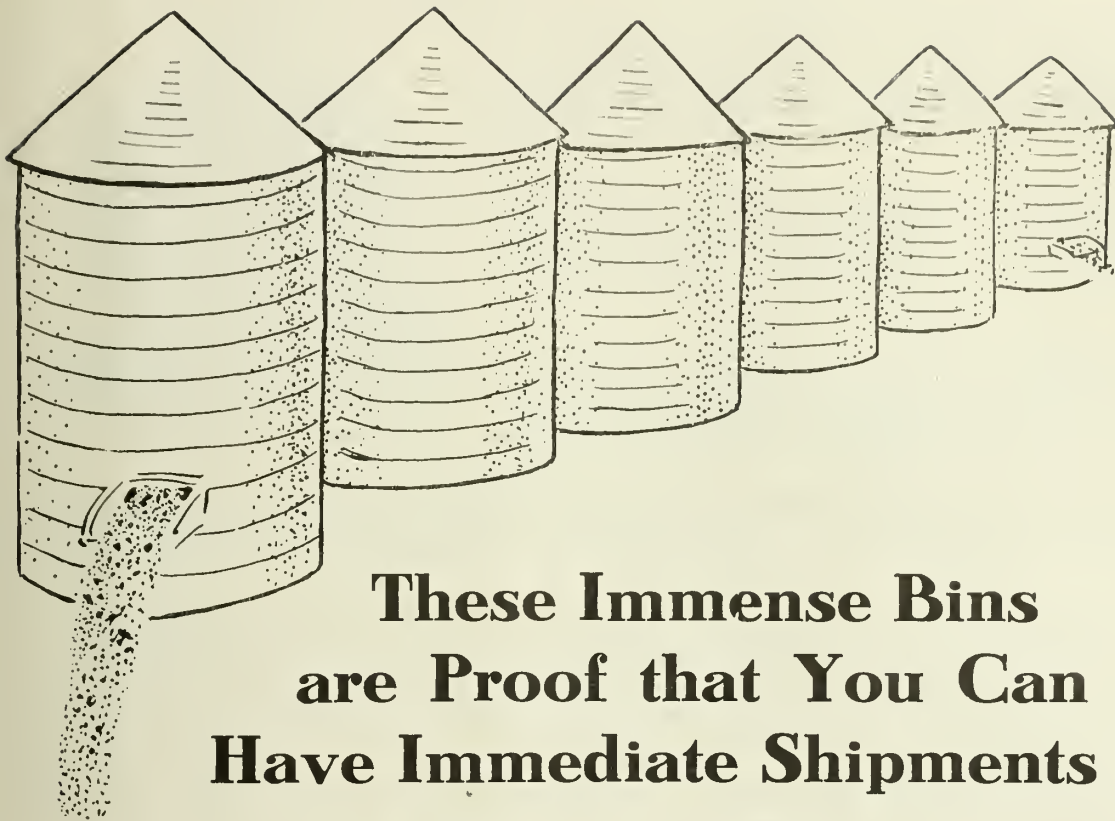


IN the upper cut we show our Straight Edge Level. In the lower cut how it is applied to any straight-edge. This little instrument is made of Aluminum, fitted with an accurate spirit glass and is fastened to the straight-edge by two screws, which allow proper adjustment. By its use any straight-edge, whether long or short, becomes a perfect level. This is much more convenient and economical than carrying an expensive level.

Ask your Dealer, or we will send sample postpaid on receipt of 50c.

Smith & Holtum Mfg. Company

CLINTON, WIS.



**These Immense Bins
are Proof that You Can
Have Immediate Shipments of**

Granite Crystals

and That Their Use is Past the Experimental Stage

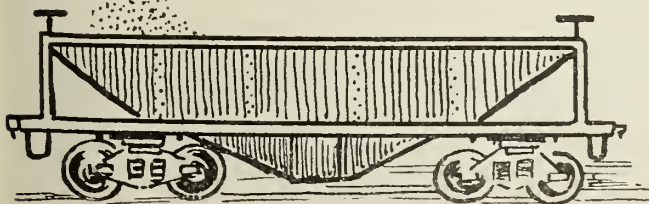
GRANITE CRYSTALS are being used now on the finest cement and concrete work in the country, such as the McAdoo Tunnels, New York; Municipal Building, New York; the Rocky River Bridge, Cleveland (the largest concrete bridge in the world), and innumerable business buildings, churches and homes in block and stucco effects.

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Our entire equipment which enables us to turn out one hundred tons per day is at your service.

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Our Special Offer:
We will furnish three one-hundred-pound bags, assorted sizes for \$1.00 to prove to you the merits of Granite Crystals.

Let Sterling Electric Motors run your concrete machinery



The concrete products plant that makes money these days, uses power-driven equipment. It increases output, cuts labor costs in two and produces a better product.

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Sterling electric motors will increase the yearly profits of any concrete plant or any construction gang. There's a difference in motors. Sterling motors are built to deliver the maximum amount of power, under varying loads, at the minimum cost.

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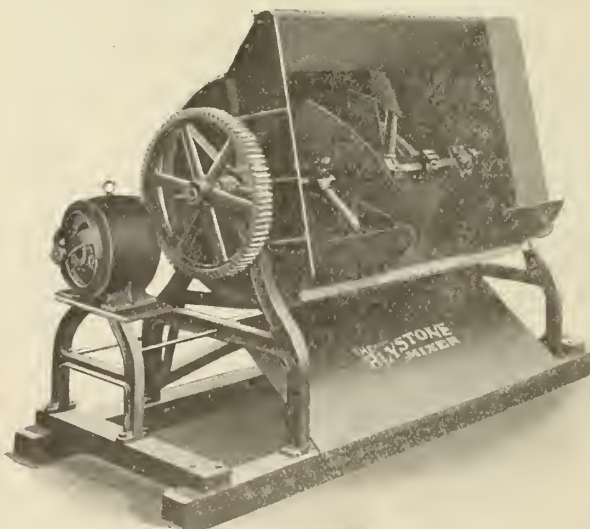
they'll deliver the cheapest power. No delays—no gang of men standing around while the boss tinkers with a balky engine. No trouble in starting a motor turn the switch and she's off and will deliver power hour in and hour out from morning till night.

In these days you can't afford to operate your machines by hand power—the march of the concrete business would leave you behind.

No more can you afford to put up with the old power troubles—it's actually cheaper for you to equip your plant right, with Sterling Electric Motors.

LET US PLAN YOUR POWER ARRANGEMENTS.

No matter whether you need power in a permanent plant or want power for portable machines on the building job, write us and let us figure with you. If you want to supply power from one motor to a group of machines, tell the total horse power you need and send a sketch of the plant arrangement. If you want individual motors for each machine, tell horse power required for each. Give us name of machines, make and size, and the kind of current you have; we will specify the best equipment for you. We'll show you the most economical method of applying power, suggest the equipment you need and quote you prices. You won't have to think the matter over for more than 24 hours before you'll see how Sterling motors can be saving money for you every day. Write us today, giving full details.



Sterling Motor Driving Blystone Mixer.

The OHIO STERLING CO.

Manufacturers of electric motors for concrete machinery

Dayton, Ohio

The Entire Line of

Northwestern Modern Concrete Machinery

is shown in the books now ready for distribution: Concrete Mixing Machines, Concrete Molds, Concrete Block Machines, Concrete Tools

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Our special mixer catalog contains a complete line of mixing machines of every size and description, from the smallest type of hand mixers up to the largest power mixing machines made. This catalog shows a complete new line of Rotary Drum Mixers built in all sizes from 7 ft. up, with combination of features that are the most attractive ever included in mixing machines. Special Sidewalk Mixers, Continuous Mixers, Block Plant Mixers and Hand Mixing Machines are shown, fully described and beautifully illustrated, many full page pictures showing exactly the details of construction. Be sure and write for this book.

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Complete line of Cinder Crushers.
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In addition to the NORTHWESTERN Line we manufacture the complete lines of several large concrete machinery concerns, and are in the market for manufacturing propositions of this kind at any time. Owing to our immense manufacturing facilities, we are naturally in position to negotiate for large contracts because of our ability to turn out the goods at much lower cost than factories not so adequately equipped.

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We want everyone interested in concrete machinery to have copies of these catalogs. Send us your name and address and advise what particular machines or moulds interest you. Any one or all catalogs sent on request. It will pay you to get our prices before making your purchases.

Northwestern Steel and Iron Works 997 Spring St.,
Eau Claire, Wis.

I don't believe in pressure as applied to concrete. I don't believe an arbitrary amount of concrete can be put into a mold and just so much pressure applied for every unit of product—I think that sometimes you'll get a porous product and sometimes the concrete won't go into the mold and your unit is oversized.

I believe in tamping—put into the mold more than enough concrete for the unit you are making—then tamp it hard and fast—churn the concrete—tamp into the mold every atom of concrete it will hold.

That's my way of making concrete products by machinery.

Herman Besser

50,000 Cement Brick per day

Don't turn away from this advertisement with the remark "Can't make 'em to compete with clay brick."

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The reason why the cement brick business hasn't flourished is because the machines wouldn't turn out common body brick at a price to let you bid against the clay product.

You can manufacture cement brick—50,000 of them a day—and compete with clay brick right next door to a clay brick kiln.

That's what the

Besser Power Brick Machine

will do for you.

This is a heavy piece of equipment. In complete form it is a whole brick plant. The cement and gravel are shoveled into the mixer, the mixer measures, proportions and feeds them, the concrete is carried to the hopper above

the brick machine, the machine tamps it into the molds, the brick are picked up by a conveyor and carried, eight on a pallet, to a car and loaded onto this car automatically—the car moves ahead nine inches after each pallet load is deposited.

From the time the materials are fed into the mixer until the car is loaded, no human hand touches material or product.

The mixture used is wet. The machine tamps it into the molds. The cylinder carrying the molds revolves slowly under the hopper and under the tampers. If the molds travel nine inches every five seconds (which is comparatively low speed) the output is over 50,000 brick per day.

This equipment is worth investigating. No matter how close to a clay brick yard you are, when you can turn out cement brick for \$3 per thousand, you have nothing to fear.

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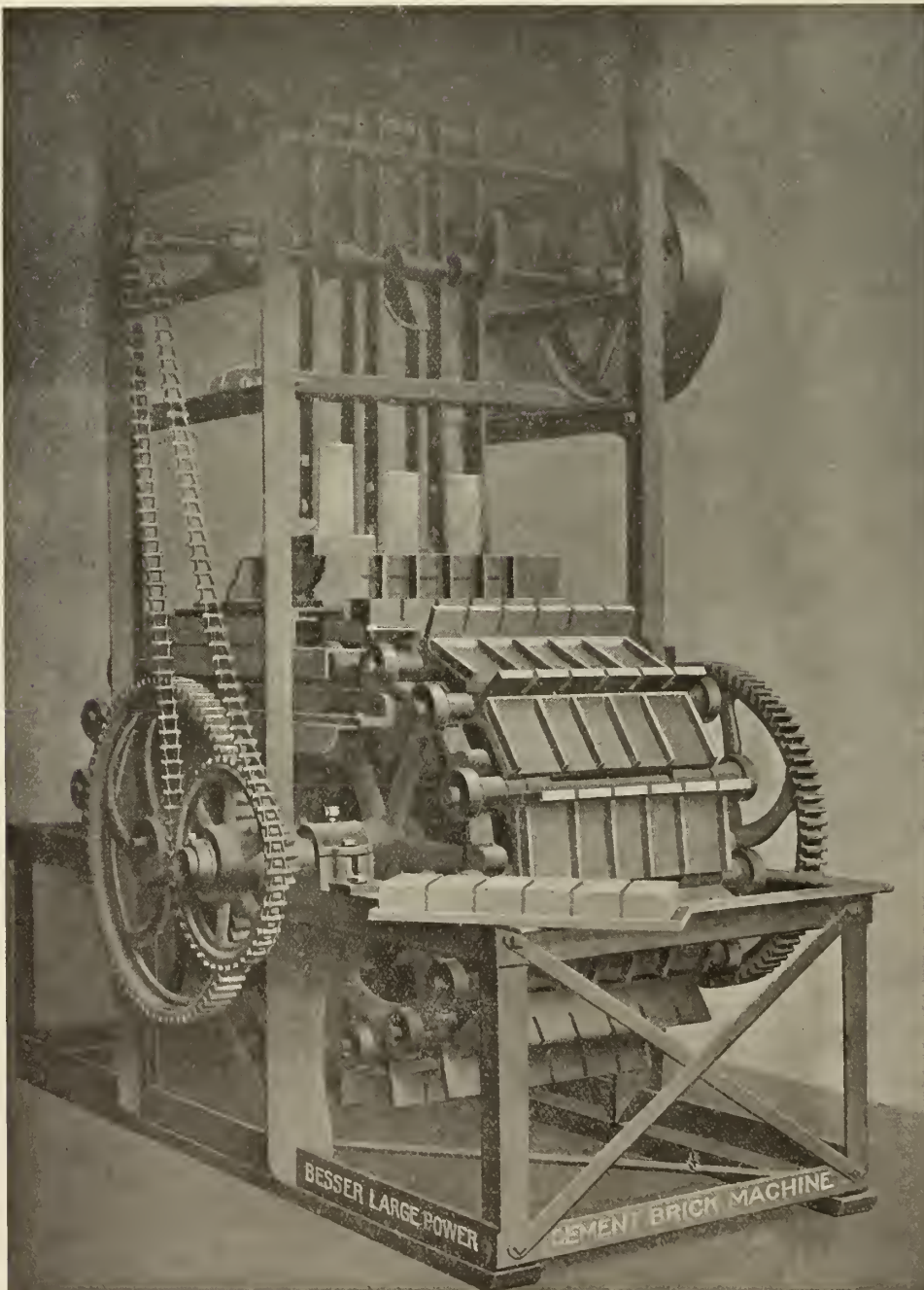
We also manufacture hand block machines, hand brick machines, power drain tile machines, power or hand sewer tile machines, mechanical block tampers, culvert molds, etc. Tell us what you want and we'll send special catalogs.

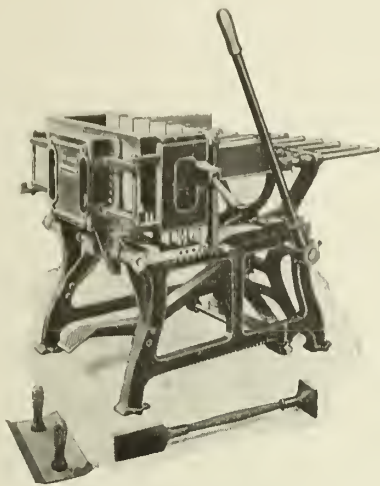
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101 12th Street

Alpena

Mich.





NO block machine was ever placed on the market that met with such immediate and remarkable success as the Hobbs. Quality always pays. We build the Hobbs a little better than seems necessary. We continue to give better value than our customers expect.

OUR good fortune, of course, is due to our customers' success, for everywhere they get the best jobs, they make the most profit.

THERE are good reasons for this. First, with the Hobbs Composition Plates they make a perfect rock faced block that not only sells better but sells for from one to five cents more than common block. Second, the oval shaped cores of the Hobbs enable them to make a very wet and therefore a very strong and water-proof block. Third, by reason of its quick changes, automatic dividing plates, etc., they can make common block cheaper than has ever before been possible. We can refer you to Hobbs customers who make a block a minute. Fourth, *Real Broken Ashlar*. This work is a money maker. It approaches and equals the best stone masonry at one third the cost. No two jobs are ever alike. There is no building too fine for this work.

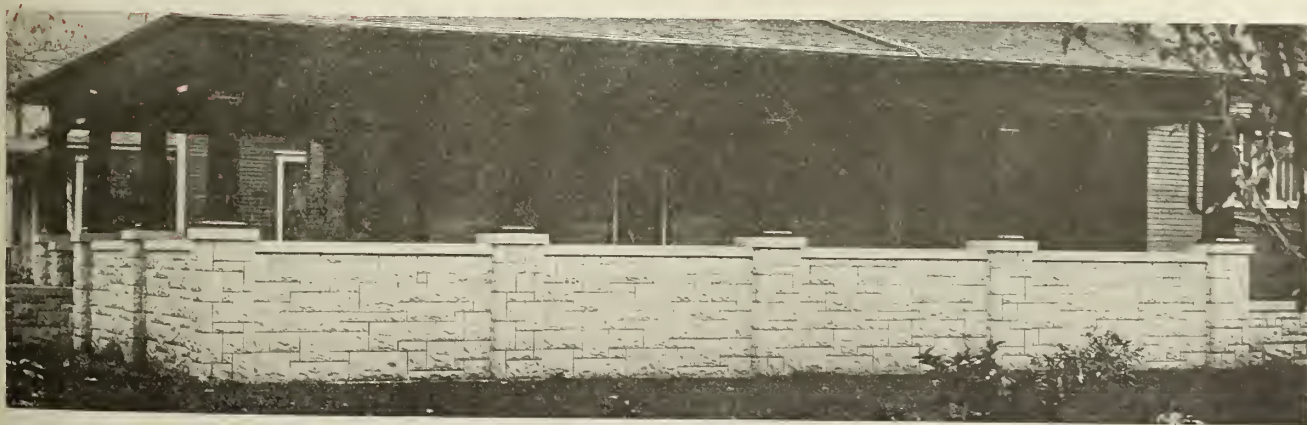
ASK yourself this question:—
If the above is true can I afford to use any other machine when I can with a Hobbs make common work cheaper and fine block better?

TO the ambitious block man our catalog reads like a novel. Write for it now. It is the first move toward a better block and a bigger profit

Investigate our claims at the New York Show. Meet us and be convinced.

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Plant, Detroit, Mich.
Reinforced Concrete Building
500 Feet long, 60 feet wide
20,000 barrels PENIN-
SULAR PORTLAND
CEMENT USED in its
construction.



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Unexcelled for Strength and Uniformity



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It is exceptionally uniform in color.

It is ground fine—over 96% passes a 100 mesh sieve.

It is made under the COWHAM SYSTEM—a guarantee of worth.

It is made in large quantities—on good railway connections—insuring prompt shipments.



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Write for Our Book on Cement.

Northwestern States Portland Cement Co.

(COWHAM SYSTEM)

Works and General Offices,
MASON CITY, IOWA,

U. S. A.

CONCRETE

VOLUME XII

FEBRUARY, 1912

NUMBER 2

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The universal use of concrete has compelled study of its every phase. Users in general are now inquiring into the dangerous element of magnesia in Portland cement. The output of most mills runs high in this element, whereas Superior runs less than 1% Magnesia. Then it is dust-fine, giving a combination that means economy and endurance. Superior is a true Portland cement. Ask for our free magnesia literature.

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Superior Portland Cement Co.

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Recommended for high-class engineering work. High tensile strength. Finely ground, light and uniform in color.

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You have a good idea

Tell the Editors of **CONCRETE**

Detroit, Mich.

CONCRETE

DETROIT, MICH.

CONCRETE PUBLISHING COMPANY

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CEMENT
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Medusa White Portland Cement used for exterior finish

MEDUSA
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Medusa Products

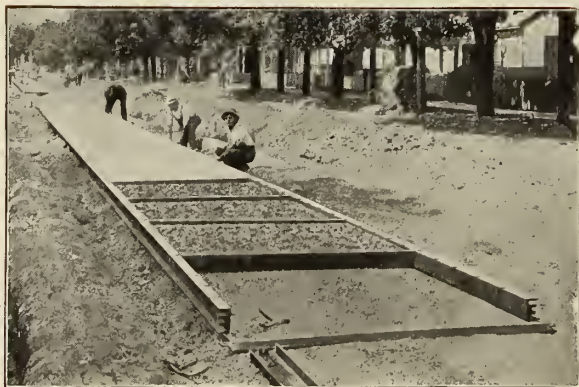
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Gray and White Waterproofed Portland Cement

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Blaw Forms are designed from the contractor's standpoint. They are light, rigid, quickly and easily handled, and will last a lifetime. The design is simple and the cost low.

The experience of The Pioneer Steel Form Builders at your service.

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Write for information, stating your requirements.

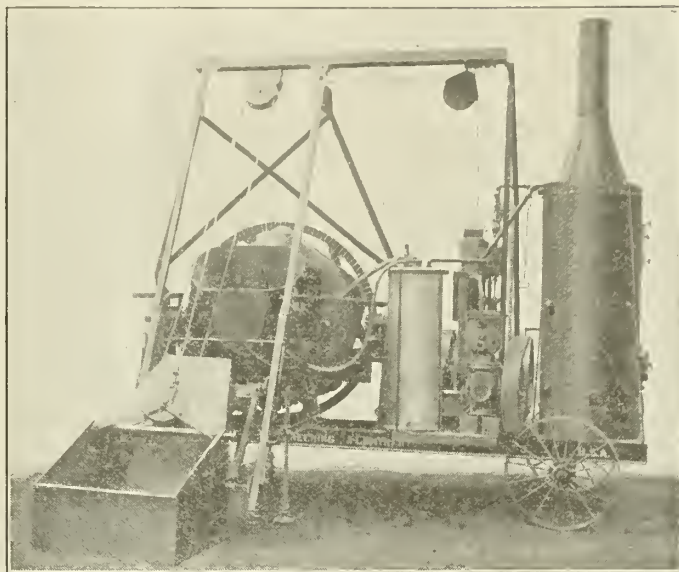
Blaw Steel Centering Company

General Offices, Westinghouse Bldg., Pittsburgh, Pa.

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Chicago—917 Ashland Block.

Lengthen the Life of Your Asphalt Pavements



The customary method of laying asphalt pavement is crude and expensive. Not one-half the efficiency is obtained, because the asphalt is not properly laid. When cracks and holes appear the asphalt is blamed, but when contractors cease pouring the liquid asphalt over the crushed stone, when they adopt the new Austin System of first drying the stone and then mixing it with the asphalt in a

Chicago Improved Cube Mixer with Austin Heating Attachment

they will get an even distribution of the asphalt over the stone and the mixture will set into a hard mass, thoroughly bonded together, without weak spots.

The cube can be charged and discharged without interrupting the delivery of heat, and two batches of hot asphalt can be turned out in from five to eight minutes.

This method of mixing asphalt and rock before laying saves asphalt, saves time, saves labor, saves expense, and produces a kind of topping that will soon be demanded by every engineer and every municipality in America. Don't be the last to adopt this life-lengthening system of laying concrete pavements.

Write for "Special Circular No. 28 describing Cube Mixer with Heating Attachment"

Municipal Engineering and Contracting Co.

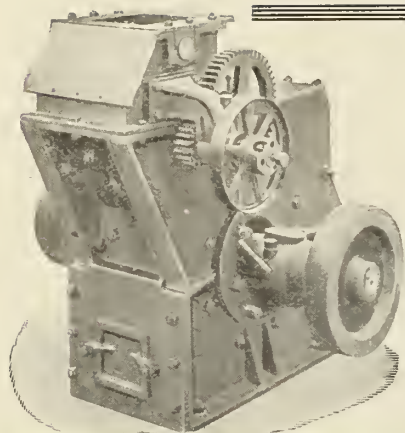
Specialists for 25 years in building high efficiency labor saving machinery for Engineering and Construction Work.

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New England Agents—Dyar Supply Company, 510 Main St., Cambridge, Boston.
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Takes larger material and crushes finer than the old style machine.

Will handle either moist or dry material.

"The maker stands behind it."

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This Index covers the entire field of engineering science, listing all articles of permanent value appearing in the technical periodicals of America and Europe during the period mentioned above, classified under

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METALLURGY
MINING ENGINEERING
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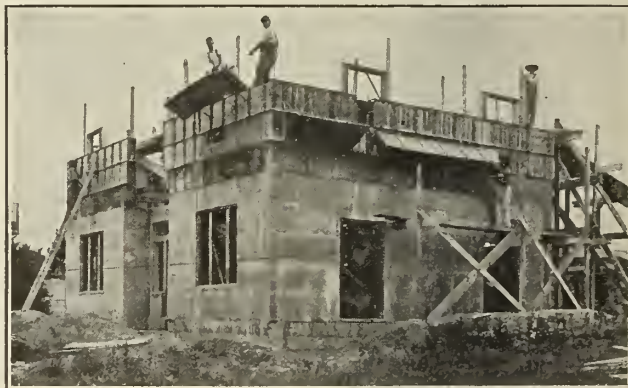
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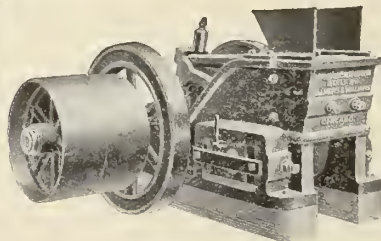
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Concrete Work**

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FARREL FOUNDRY & MACHINE CO.
HAVEMEYER BLDG., NEW YORK



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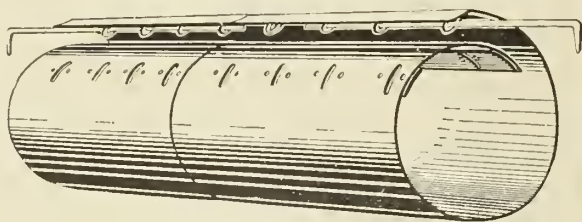
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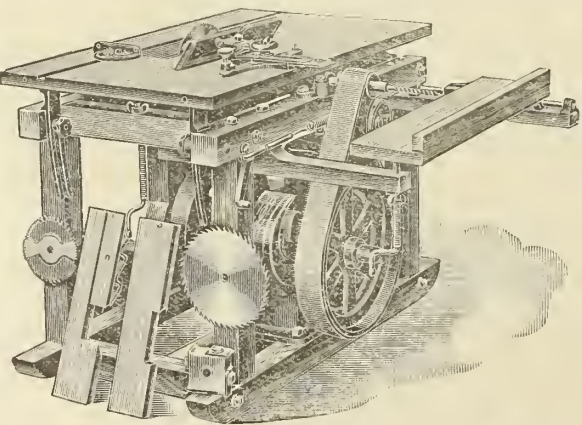
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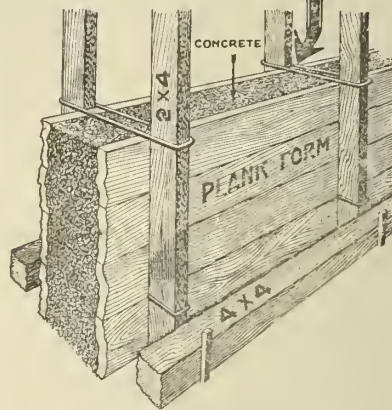
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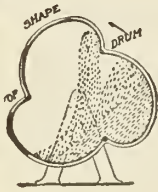
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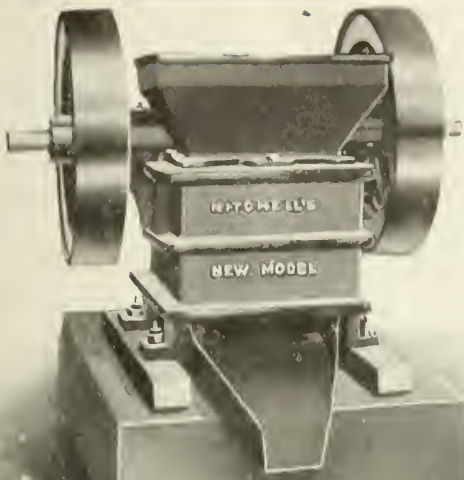
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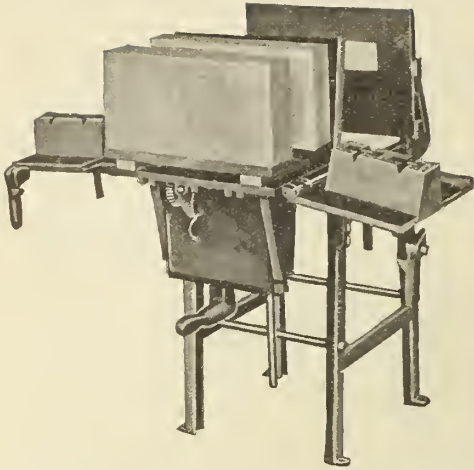
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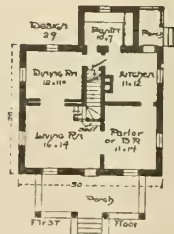
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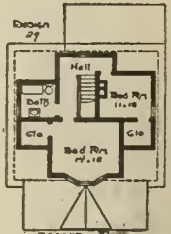
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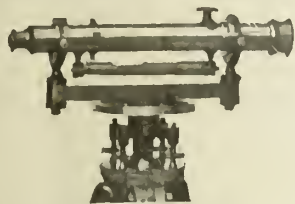


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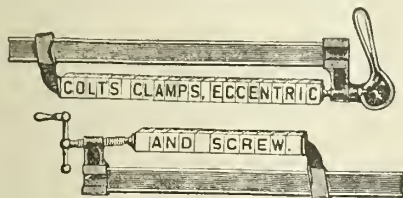
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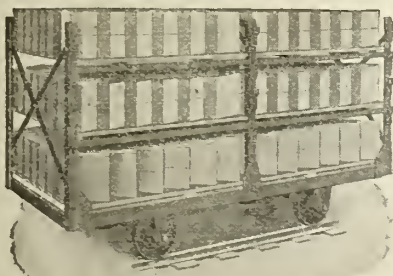
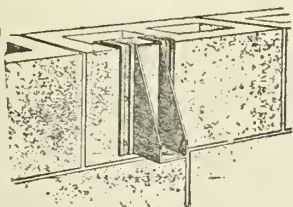
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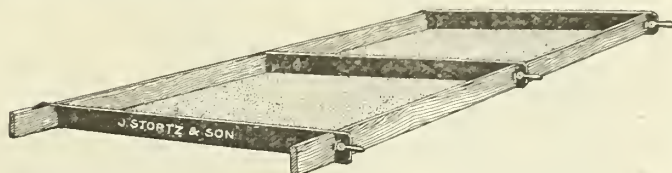
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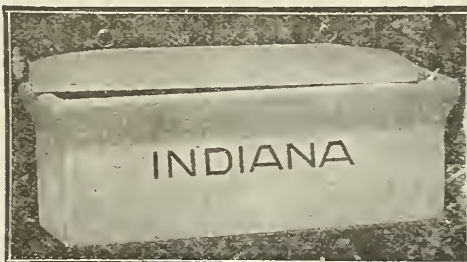
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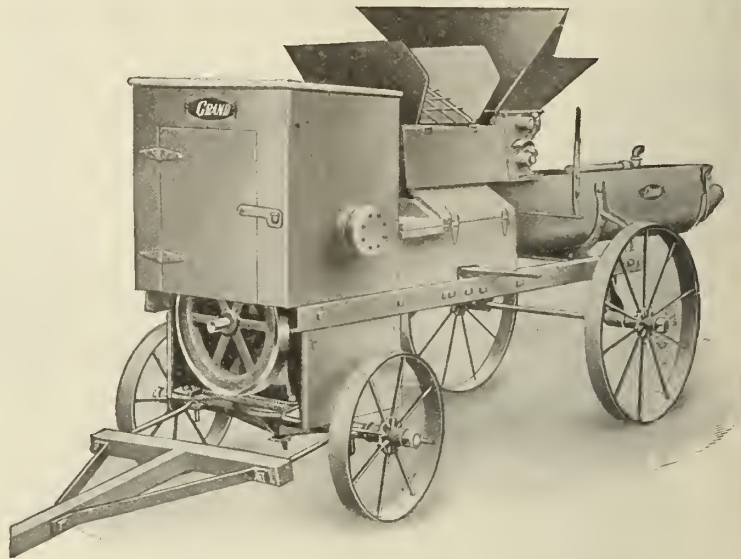
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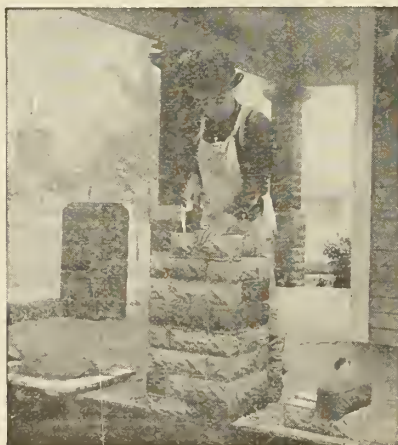
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The Cement Era Publishing Co.
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1912 EDITION

NOW READY

A thorough revision of the well known Directory of Portland Cement Manufacturers, together with Manufacturers of Gypsum and Lime, bringing down to date descriptions of manufacture, capacity, capitalization, accompanied by names of officers and superintendents, post-office addresses, a list of brands and a buyer's guide.

This directory stands alone. It has an established reputation of six years as reliable, up-to-date and authentic, complete, neat and handy. Is so useful and handy to anyone in these industries that it is almost indispensable. Order now for early delivery. Sent prepaid for \$1.00. Will contain about 300 pages, 3x5 inches, to fit the pocket; bound in black flexible leather covers; gilt edges.

**The Directory of Portland Cement
Manufacturers**

1207 Morton Bldg., - Chicago, Ill.

Experienced Tile Men

who are already in the cement tile business and have tile machines of other makes are buying more

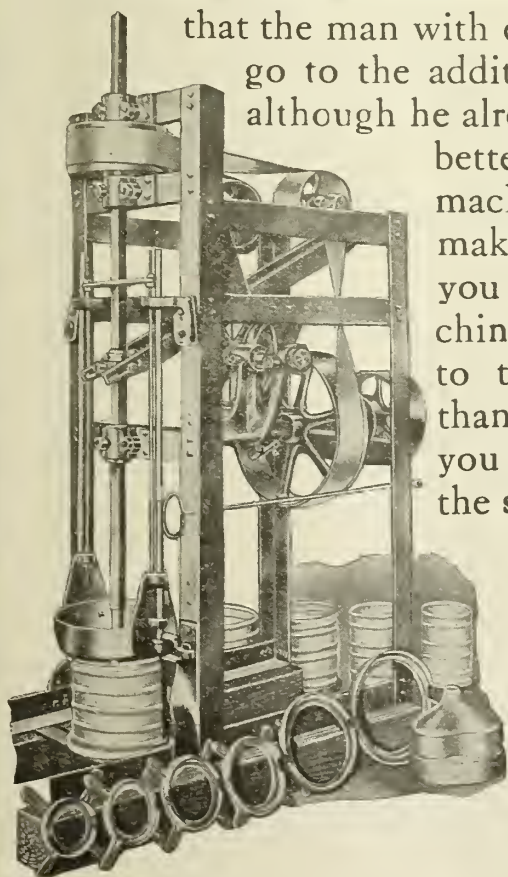
McCRACKEN TILE MACHINES

than we are selling to customers who are just starting in the business. Now the question for you to decide is this: Are you a better judge of what a successful tile machine should be than the fellow who has had the experience?

Twenty-seven of the last 49 McCracken Tile Machines we have sold were sold to people who already had other makes of machines.

This Proves Two Things

that the man with experience can see where it pays him to go to the additional expense of buying a McCracken, although he already has a machine, and that you are a better prospective customer for a McCracken machine after you have bought any other make of machine and used it for a time than you are right now before you buy any machine. Now if we are selling more machines to the people who already have machines than we are to new customers, it might pay you to buy a McCracken machine right on the spot and have to buy but once.

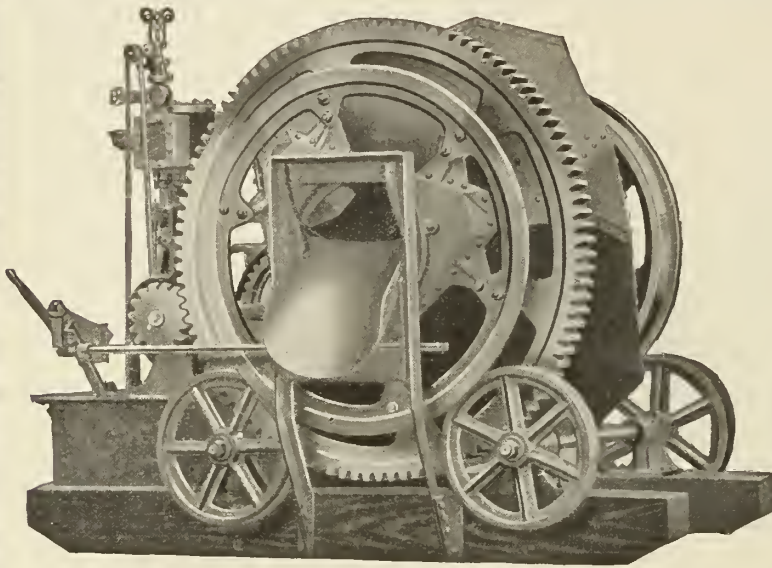


Don't fail to see our Machine
in operation at Booth 117 at
the Chicago Cement Show

Write for Our Proposition

Sioux City Cement Machinery Co., West Fourth & Perry Sts.,
Sioux City, Ia.

Cockburn Cubical Concrete Mixer



No objectional features, such as devices for tilting the machine to discharge. In operation it is charged and discharged while in motion and is easily cleaned.

The charging level has been reduced to a minimum, at the same time maintaining a maximum discharge height. It mixes evenly and thoroughly—discharges evenly and steadily, insuring a uniform batch with every discharge.

Get this Mixer and you'll get the best.

Write for Prices and Bulletin M.

The Mixer That Delivers the Goods

COCKBURN COMPANY

Engineers and Manufacturers of Contractor's and Industrial Equipment, General Machine, Forging, Plate and Sheet Metal Work.

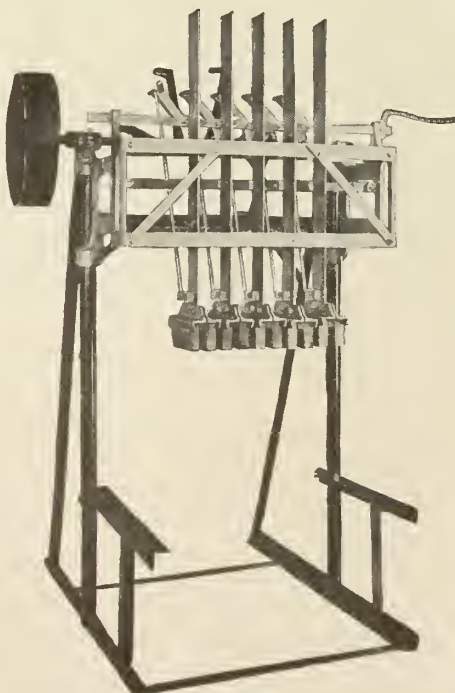
12th and Monmouth Streets

Successors to

Cockburn Barrow & Machine Co.

JERSEY CITY, N. J.

DON'T TAMP YOUR LIFE AWAY



You CAN'T make good blocks or brick or other concrete products tamping along by hand. Your men start off nicely in the morning but the strokes get lighter and lighter as the day grows—the last block tamped at night isn't anywhere near as dense as the first one made that day. And your output is limited by your TAMPING, not by the speed of your block machine.

Increase your capacity, improve your product and save backache by installing a

NOLAN AUTOMATIC TAMPER

Built of angle steel. Mounted on the floor or hung from the ceiling. Fits any block or brick machine. Size, number and arrangement of tamping arms easily adjusted to fit any machine. Each tamping arm delivers a 50-lb. stroke, SIX TIMES EVERY SECOND.

The device is so constructed as to operate with a minimum vibration and is practically noiseless.

The purchase of this tamper won't be an EXPENSE, it'll be an INVESTMENT which will yield 100% return in a few weeks.

Write for descriptive circulars and details.

Automatic Concrete Machinery Co.

141 East Fifth St.,

ST. PAUL, MINN.

CEMENTKOTE

The fact that many of the largest users of concrete in the country are using CEMENTKOTE—that the largest concrete elevator in the world is damp-proofed with CEMENTKOTE—only goes to prove our contention—

That—Every Builders' Supply Co., Contractor and Architect should know that—They can get a damp-proofing that will damp-proof.

That—CEMENTKOTE beautifies and prevents spotting.

That—CEMENTKOTE lasts as long as the cement itself.

That—CEMENTKOTE does not interfere with the chemical action of the cement.

That—Anyone can apply CEMENTKOTE.

That—CEMENTKOTE is made in soft and pleasing shades.

That—CEMENTKOTE is not an experiment. In other words every Dealer, Contractor and Architect should know all about CEMENTKOTE. Ask for samples and descriptive matter, or better still, ask to have one of our representatives call on you.

The Tropical Oil Co.
CLEVELAND, - OHIO



For Concrete Floors

Concrete floors are made dust-proof, durable, elastic and impervious to water by the application of "Cementseal." No amount of heavy trucking or other abrasion will mar the surface.

Cementseal Wears Like Tiling

One gallon of this preparation will cover from 250 to 300 square feet of concrete floors, two coats. No primer needed.

CEMENTSEAL is elastic, sanitary, economical, dust-preventive, waterproof, acidproof, alkaliproof, greaseproof, easy to keep clean; it never chinks, peels nor chips, it brightens the floor and gives it the consistency of hard rubber.

Made in five tints. Write for booklet describing this floor finish and color card showing tints.

THE ACORN REFINING CO.
CLEVELAND, O.

Cemeline

Richmond Bros.,
117 Sixth Av. E.,
Cincinnati, O.
I enclose \$1.65 for 1 gal.
of CEMELINE

Name
No.
St.
City
State

C-8-11

If you want to make your concrete proof against water, fire, acids and alkalis, paint it with Cemeline, "cement's proper affinity." This forms an impervious coating which not only protects the structure but decorates it. It comes in nine colors. Send the coupon and get a sample can for trial.

Cemeline

CEMENT'S PROPER AFFINITY

CEMELINE is a thorough waterproofing. It hermetically seals the surface of the concrete, filling all the voids. Prevents the appearance of stains. Colors the surface in pleasing tints without defacing the natural texture of the concrete.

It costs \$1.60 per gallon in 5-gal. lots. Send the coupon with \$1.65 and get a sample gallon. Try it. See how you like it.

RICHMOND BROS.

Paints and Varnishes

117 Sixth Ave. E., Cincinnati, O.

Cemeline

Coleman's Waterproof Filler

A waterproofing liquid that does the work effectively and permanently. A positive water resistant and shield against dampness and decay. Not a stain nor a coating but the only transparent waterproofing liquid FILLER patented. Chemically prepared and designed for waterproofing Concrete Blocks, Brick Walls, Stone, Wood, Plaster, Kalsomine. Penetrates the surface and becomes a part of the material to which it is applied. An honest compound. The best by test. Give it a trial. Send for Booklet.

Virginia Waterproofing Corp. Mfrs.

324-326 Arcade Building,

NORFOLK, VA.

BITU-MORTAR
WATERPROOFING
WATERPROOFS PERMANENTLY

A bitumen preparation which bonds to old or new walls and waterproofs cellars and foundations PERMANENTLY, even when water is seeping through. Applied inside or outside of walls. Resists any water pressure that the wall itself will stand.

THE BITU-MORTAR CO.

342 E. 27 St.

NEW YORK CITY

Send for a free copy of our book, "The Ideal Method of Waterproofing."

SCRAP THE REST—USE THE BEST

HERE IT IS

If You are One of These

Who Want to Improve Your Factory and Make
REAL CONCRETE STONE

At Less Cost than Blocks You Now Make. Be the
Only Concrete Man of Your Locality. Have a Real
Business and Be Proud of It.

WRITE US NOW FOR OUR PROPOSITION

Test of our Concrete Stone, 3,500 lbs. per sq. in., 4% Absorption.

Mixture 8 to 1.

How Does Yours Compare?

Send us a sample. We will test it.

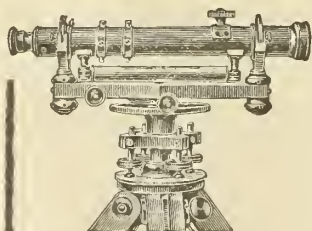
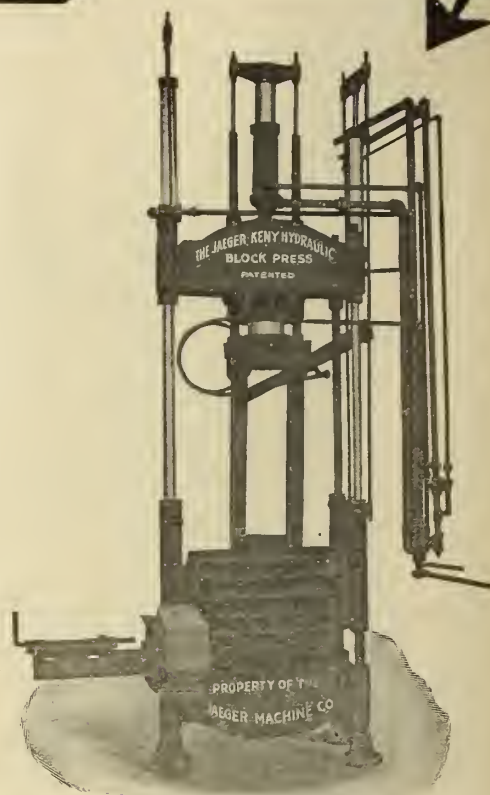
Which is your choice?	Which will stand up?
Which would you rather sell?	Which will hold your customer?
Which would you rather use?	Which will weaken his confidence?
YOU KNOW	WE KNOW

It is not a Little Question—But a Big One.

ARE YOU GOING TO CONTINUE IN THE BUSINESS?

At the three big cement shows, see the first moving pictures ever
produced showing a concrete products plant in operation.

Jaeger Machine Company
COLUMBUS, OHIO.



The illustration shows
our Architect's and
Builder's Level, for level-
ing walls, laying out an-
gles, grading streets,
sewers, drains, sidewalks,
etc. Ask for Circular 25.

LEVELS

The purchase of a level
or a transit isn't an ex-
pense, it's an investment.
Many times, by avoiding
errors, you can save the
cost of the instrument on
one job. Mistakes are
expensive. Engineers,
contractors, architects and
builders who use Kolesch
levels have error-proof
work.

KOLESCH & CO.

Surveying Instrument Makers. Established 1885
138 Fulton St. NEW YORK

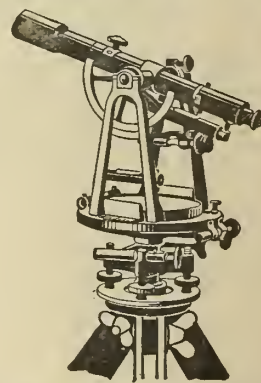
BUFF

The Buff is old in name,
but the most modern and up-
to-date in construction. It is
made by experts for the use
of experts.

Send for Catalogue 32

Buff & Buff Co.

Jamaica Plain Station
BOSTON, - - MASS.



For Extra Strong Concrete Construction

such as COLUMNS AND POSTS,
GIRDERS, LINTELS, AND ARCHES,
CEILINGS AND FLOORS, ETC.
for all concrete, re-inforced or otherwise, where great strength
is required.

Use our **Crushed Granite** all sizes.

Compression and tensile strength five times greater than lime-
stone concrete or concrete made of any other aggregate.

BEST MATERIAL ON THE MARKET FOR MACADAM ROAD

For Wearing Surface of Cement Roads, Factory Floors, Facing
for Cement Blocks or Monolithic Concrete, use our

GRANITE SCREENINGS

We are also Miners and Shippers of
CONCRETE SAND AND GRAVEL

Michigan Portland Cement Paving Co.

Plant and Pits at Clarkston, Mich. Phones: Cherry 3080
Office: 915 Chamber of Commerce Bldg., Detroit, Mich. City 1030

Somers Pressure Block Machine

This is a machine that molds concrete blocks under heavy
pressure—the concrete is pressed into a block that defies com-
petition. Somers
blocks have passed
the severest tests suc-
cessfully.

WET MIXTURE—

The only true con-
crete is made of coarse
materials, mixed wet.
Get a machine that
will handle such a
mixture without stick-
ing. We have just is-
sued a book that tells
just how such blocks
are made. Write us
for a copy.

Somers Bros.

Box A, Urbana, Ill.



BUY a block machine that you can expand—one that will make anything from a 4-in. block to a 6-ft. sill—a machine that will grow as your business grows.

If you're just going into the block business, start right. If you're already in business, make sure that the machine you have is turning out the highest class work at a cost that leaves you a profit. Get a block machine that makes blocks of wet mixture, face-down. Get a machine whose product has the approval of architects.

Such a Machine as the **HERCULES**

On this machine the block for the house shown here were made. Look at the perfect broken ashlar in the first story. Note the handsome, impressive plain-faced block in the second story walls.

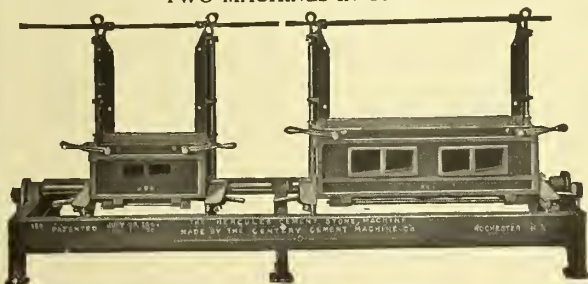
Send for "The Little Book"

This booklet fits the vest pocket. It tells how money is made in the block business. It is full of block information. As booklets go, this is a nugget. Write for a copy today.

Century Cement Machine Co.

285-295 St. Paul St., - - - ROCHESTER, N. Y.

TWO MACHINES IN ONE



Vaughan's Patent Concrete Spade

A Tool for Finishing Concrete Walls

**IT PAYS FOR ITSELF
IN A DAY'S WORK.**

By use of Vaughan's Patent Concrete Spade, you can force the coarse aggregates in the concrete back, while the forms are still about the wall, and let the finer cement mortar flow forward, the perforations in the spade allowing it to come to the front. Your wall is thus given a smooth finish, without applying face mortars.

Manufactured only by

J. H. CLARK

Manufacturer of and
Dealer in

**CONTRACTORS TOOLS
AND SUPPLIES**

137-139 W. Lake St., Chicago



WATERPROOFERS That are GUARANTEED

LAPADAS

TO BE MIXED WITH CEMENT OR CONCRETE

LAPADAS is a chemical preparation of a mineral base which comes in a paste-like liquid put up in 3-gallon containers, which is the proper amount to mix with a 48-gallon barrel of water. This forms a chemical combination with the soluble materials in the cement, causing them to become insoluble, acting as void fillers and making your concrete or cement proof against the penetrating of dampness or water.

LAPADAS imparts an elasticity to the masonry, cement, concrete or stucco, so that the expansion and contraction resulting from the change of temperature does not cause cracks and disintegration.

LAPADAS has been used successfully in waterproofing stucco concrete walls, cement floors, tanks and retaining walls.

SOLOTO

LIQUID WATERPROOFING

To be Used as a Coating

SOLOTO is a transparent liquid which is applied to the surface of brick, stone, concrete or stucco work with a brush or spray. The number of coats required to effectively waterproof depends upon the porosity of the wall—two or three coats are usually sufficient.

SOLOTO can be made up in any shade desired and acts as a tint or stain, bringing out a dull finish, making the work upon which it is applied the true color of stone or cement. SOLOTO is not a paint. It is proof against the acids and alkali conditions which are found in all classes of masonry construction.

One gallon of SOLOTO will cover approximately 100 to 150 square feet—two coats.

McCOY'S ELASTIC CEMENT

For calking up around windows, doors, roofs, skylights, vault lights and cornices

Write for "Facts on Waterproofing"

HYDRO-BAR WATERPROOFING COMPANY

Waterproofing Engineers and Contractors

519 West 19th Street

New York City

5 to 8
Cubic Yards
an
Hour

You can buy this mixer of known value for almost what you might pay for something else.

If you build sidewalks, curbing, gutters, small foundations—here is your ideal Mixer—a high grade mixer with dozens of advantages over the ordinary kind—and placed in your hands at a price we know will please you.

We can convince you that this equipment is far above the average in advantages, quality and performance.

It will give you 50 to 80 cubic yards of thoroughly mixed, uniform concrete every 10 hours with one-half the men you would use by hand mixing.

Every part of this mixer is made to exact size by jigs and gauges—an important item in the event of replacements. It is built in such quantities as to give the purchaser every advantage in price.

Eureka Automatic Measuring and Time Mixing.

The cut shows the Eureka as delivered at your shipping station—all ready to run. Shipped anywhere in United States to responsible parties, subject to satisfactory tryout. We want you to test it thoroughly—change the proportions and see that they run true to schedule—use it on any class of material—examine the concrete and satisfy yourself as to its quality—show its work to your city engineer or architect—convince yourself that it is built to last. We can afford to make you any reasonable business proposition, for we have the goods to back up our representations. Remember the Eureka is built in all sizes from 5 to 25 cubic yards per hour.

Get our catalog—and ask for names of Eureka users in your locality.

General Eastern Agts.
W. V. JOHNSON & CO.
1 Madison Avenue
NEW YORK CITY

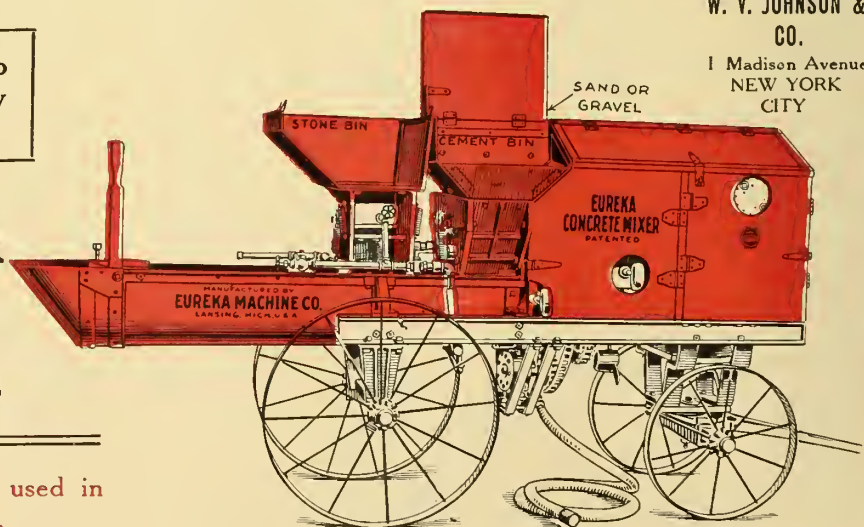
Exhibits at Chicago
and Kansas City
Cement Shows.

EUREKA

Machine Co.

60 Handy St., Lansing, Mich.

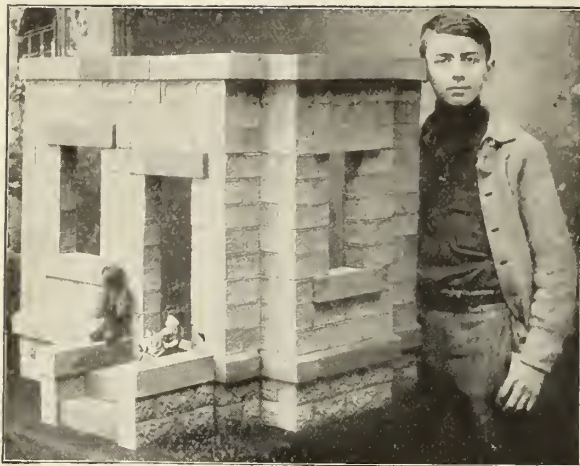
Over 250 EUREKAS used in
New York City.



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CHICAGO'S HOME LIKE
HOTEL
Bismarck
175 W. RANDOLPH ST.
NEAR CITY HALL & THEATRES
200 MODERN ROOMS
FREE SHOWER BATH
RATES \$1.00 UP
PRIVATE BATH \$1.50 UP



SOMETHING FINE FOR YOUR BOY AND FOR YOURSELF ALSO

The cut shows a Doll's House the boy has built for his sister, using real hollow cement blocks, made by himself in the SIMPSON JUNIOR CEMENT BUILDING BLOCK OUTFIT. This is only one of scores of houses of all kinds that he can build—a work shop for himself, a chicken coop, a dog kennel, an enclosure for a garbage can, models of residences, schools, churches, stores, etc. Notice the rock face foundation blocks, the bush hammer range blocks, the panel face blocks, the water table, cornices, copings, steps, window and door sills and caps. The Junior Outfit produces them all. This is the latest addition to the list of

SIMPSON MOLDS

It has wonderful possibilities and is the greatest educational toy a boy ever had—but it is very much more than a toy. The price is **THREE DOLLARS**, by express, charges prepaid to any point in the United States. We have a special circular telling all about it which we would like to send you.

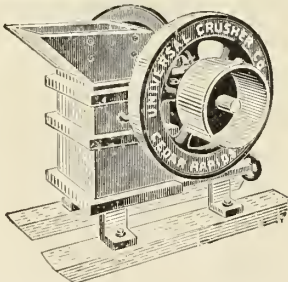
But this is only one small feature of our business, which is chiefly the manufacture of molds for

Porch Trimmings, Garden Furniture and other Ornamental Work

OUR CATALOG IS THE GREATEST IN THIS LINE EVER ISSUED, CONTAINING A GREAT NUMBER OF SPECIAL HALF-TONE ENGRAVINGS OF FINISHED PORCHES AND OTHER STRUCTURES. SEND FOR IT, USING YOUR BUSINESS STATIONERY OR ENCLOSING YOUR BUSINESS CARD.

THE SIMPSON CEMENT MOLD CO.

101 VINE ST., COLUMBUS, OHIO.



Manganese jaws, replaceable BRONZE bearing shells. Any size product, 2½" to sand, in one operation. A crusher and fine grinder combined. The original Universal. Pat. 1906. Do not be deceived by imitations.

The Universal Crusher

The Universal has made good. Hundreds of people kept their eyes on the machines we installed during the spring and summer. Their orders have been piling in all through the dull season.

The Universal Has the Confidence of the People

TAKE IT AS A HINT TO YOU—

People everywhere KNOW that the Universal is offered at the lowest price ever made on a crusher of similar merit and capability. It makes good so surely everywhere that we can ship you one at OUR risk, on 30 days' trial. Investigate the Universal—NOW. Don't wait until the spring rush. A crusher for every use, made in all sizes. Exhibits at Chicago and New York Cement Shows.

Universal Crusher Company

502 F. Ave., Cedar Rapids, Iowa

IMPORTED CEMENT COLORS

Fast to Light, Air, Acid and Alkali That Are Being Used Satisfactorily for

**Stucco, Waterproofing,
Artificial Stone, Etc.**

Red, Buff, Brown, Green, Blue, Black
White, Etc.

Prices Favorable—Prompt Shipments—Quality
Always Uniform.

If you buy Colors, communicate with Headquarters,

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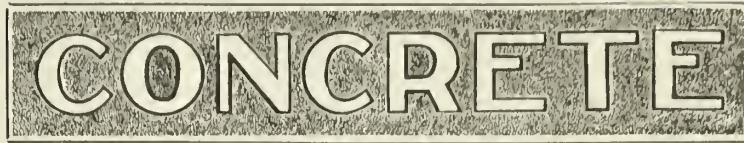
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HERMAN BESSER.

Standard Journal
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Uses of Portland
Cement.



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Correspondence solicited on all matters pertaining to cement manufacture, and concrete construction in all its forms. Discussions, notes, and inquiries from engineers and others will be gladly received.

Advertising rates upon application. Complete information regarding size, character and distribution of circulation cheerfully furnished upon request.

In requesting change of address, please give former address

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Concrete Organizations, Officials and Conventions

National Association of Cement Users, Harrison Bldg., Philadelphia, Pa. Convention, Kansas City, Mo., March 11-16, 1912.

Cement Products Exhibition Co., 72 West Adams St., Chicago, Ill.; Secretary-Treasurer, J. U. C. McDaniel, 108 La Salle St., Chicago, Ill.

Western Cement Show, Coliseum, Chicago, Ill., February 21-28, 1912.

Kansas City Show, Convention Hall, Kansas City, Mo., March 14-21, 1912.

Northwestern Cement Products Association, J. C. Van Doorn, Secretary, Security Bank Building, Minneapolis, Minn.

Iowa Association of Cement Users; Secretary, Ira A. Williams, Ames, Ia.

Nebraska Cement Users' Association, Columbus, Neb.; Secretary-Treasurer, Peter Palmer, Oakland, Neb. Midwest Cement Exposition, Omaha, Feb. 6-9, 1912.

Oklahoma Cement Users' and Contractors' Association; Secretary, D. C. Patterson, 336 Bassett Bldg., Oklahoma City, Okla.

Concrete Machinery Manufacturers' Association; Secretary, Le Roy A. Kling, Cedar Rapids, Ia.

Canadian Cement and Concrete Association; Secretary, William Snaith, 57 East Adelaide St., Toronto, Ont.



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—WITHOUT FORMS—

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CONCRETE

Vol. XII

FEBRUARY, 1912

No. 2

Editorials

DEVELOPMENTS in the use of concrete come so rapidly nowadays along with new methods and devices and new standards, that there should be a great deal of nutritive meat in the convention of the National Association of Cement Users, which will be held in Kansas City, Mo., March 11-16. The convention opens three days before the opening of the cement show to be held in Kansas City, March 14-21, and thus overlaps the show three days. The convention and show combine to make an attraction which progressive men in the industry will find it hard to resist.

* * *

THE house of Augustus, one time Emperor of Rome, was built on the Palatine in the ancient city. The foundation walls are of concrete, which supported the massive brick arches of the superstructure. The concrete walls still stand. And we know that the Romans went about their concrete construction much as we do. They used good concrete, for the surface has not scaled or chipped in all these centuries. You may still discern on the walls the marks left by the grain of the wood forms.

* * *

IN MANY communities, concrete block construction has suffered at the hands of its friends. Price competition has led to the production of poor block. The manufacture of poor block has often prejudiced architects and the general public against all concrete products. Why don't the block men organize more local associations? Let them get acquainted, one with another. A little neighborly spirit will help. We know of some cities and towns where this has been tried. The association maintains a standard of excellence for the products its members manufacture. It helps advertise concrete construction. It develops more and better business. We believe it's a good thing.

* * *

WE HEAR a great deal about concrete being urged on the ground that it is "cheaper than this" and "cheaper than that." We are always glad to learn that a concrete "anything" has been built successfully at less initial cost than with some other material. This, however, is only a small part of the consideration. It is all right to urge and to keep on urging the advantage which concrete construction has in *ultimate economy*, but there is altogether too much said about mere *cheapness*. Too much emphasis on this feature does not make for good work.

* * *

THERE was long and bitter warfare in Kansas City, Mo., between the clay interests and the manufacturers of concrete sewer pipe. The Kansas City Common Council is to be congratulated that it has seen the light and that concrete pipe has been admitted to competition with the clay product. The first concrete pipe sewer work was begun in Kansas City, December 23, 1911. Other cities may be interested to know that the admission of concrete pipe in this competition has resulted in a re-

duction in price of clay pipe of from twenty to forty per cent. Recognition of a better product at less money did the trick.

* * *

More Concrete Highways.

The Highway Engineers of Missouri are going to attend the cement show to be held in Kansas City, March 14-21. We are glad of it. The announcement that the Missouri Highway Engineers Association will hold its convention in Kansas City at the time of the cement show, indicates that highway engineers are feeling very strongly what the changes made by progress in the use of concrete will bring to their line of business. Concrete pavement, plain or reinforced, as occasion has demanded, has given satisfaction, not only for the heavy traffic of the city, but for an enduring highway on the traveled roads of the country.

* * *

A Certain and Safe Cure for the Blues.

If a paper cannot furnish its subscribers with valuable information, it can sometimes amuse its readers by merry jests and laughable items. A recent issue of one of our esteemed contemporaries in the clay brick field has gone into the industry of furnishing joke stuff, some of it all the more cheerful because it is apparently so unconscious.

The issue referred to publishes a list of thirty-nine "failures" of concrete that have occurred within three years. Numerous deaths are reported, and the list is a trifle padded by such items as "1909—Kingston, Ont., Oct. 14th, reported failure of concrete tank." "Reported," please notice, not authenticated. Many of the "disasters" have been investigated by the daily papers and the engineering press. One "failure" is that of the Austin dam, which is listed: "Austin, Pa., Sept. 4 (1911), 300 people killed in terrific concrete dam collapse." The dam did not collapse; it moved forward on its foundations, which were of natural rock, because the foundation was undermined and acted upon by the water. It would be just as sensible to blame God Almighty for the Austin accident as to blame the concrete in the dam.

But now for the joke. After saying that the "progress of concrete is marked with a trail of blood," and that there will be an ending to the "concrete fad," the writer gracefully avoids all appearance of partisan zeal and the bias of the beaten man by saying:

"Of course the concrete enthusiast will declare that any article on this subject, particularly in a clay publication, is simply a 'knock' against a competitive material."

Why—of course not! Whoever heard of a brick man "knocking" concrete? But we interrupt the writer. To resume:

"We do not wish it understood that we disparage the value of Portland cement as a useful and valuable material. On the other hand, much of our modern progress has been due to the adoption of this material for a large variety of uses for which it is particularly suitable. We do protest, however, against the exploitation of cement in uses for which it is unsafe and unsuitable

and when it is liable to become a menace to life and property."

Can you beat it? In one breath concrete is leaving a trail of blood and in the next its value as a useful and valuable material is not disparaged. Truly, the clay papers have comic departments, all their own.

* * *

See and Believe.

An article on page 29 you should not fail to read. It is about the success of the second annual Cement Show in Madison Square Garden, New York City, January 29 to February 3. The more of these exhibitions you are able to see the better. But if you did not go to New York you should be in Chicago February 21 to 28 for the big exhibition in the Coliseum. CONCRETE tries to tell, and we believe it succeeds reasonably well in *telling*, of the new things in the industry. Conscious as we are however of the benefit of reading, *reading* is not so good as *seeing*. The Cement Shows bring the best things together where they may be seen. When you receive this issue of CONCRETE the show of the Nebraska Cement Users' Association—The Mid-West Cement Exposition—will be on in Omaha, February 6 to 9. The third show this year of the Cement Products Exposition Co. will be held in Kansas City March 14 to 21.

* * *

Tell Us Your Best Idea.

Numerous concrete products manufacturers have sent us good ideas which we are going to print very soon. You may remember that we announced a contest. We offered to pay \$10 for the best suggestion as to a labor saving, time saving or money saving device in a concrete products factory. It makes no difference whether it is home-made, patented or merely a plan of layout. We want to pass along the good ideas. Aside from the first prize offered, we will give a year's subscription to CONCRETE to each of those whose suggestions we print, and we expect to print a good many. We haven't received enough of these suggestions so we are extending the time of the contest to March 1. Write out your idea today and send it to the Editors of CONCRETE.

* * *

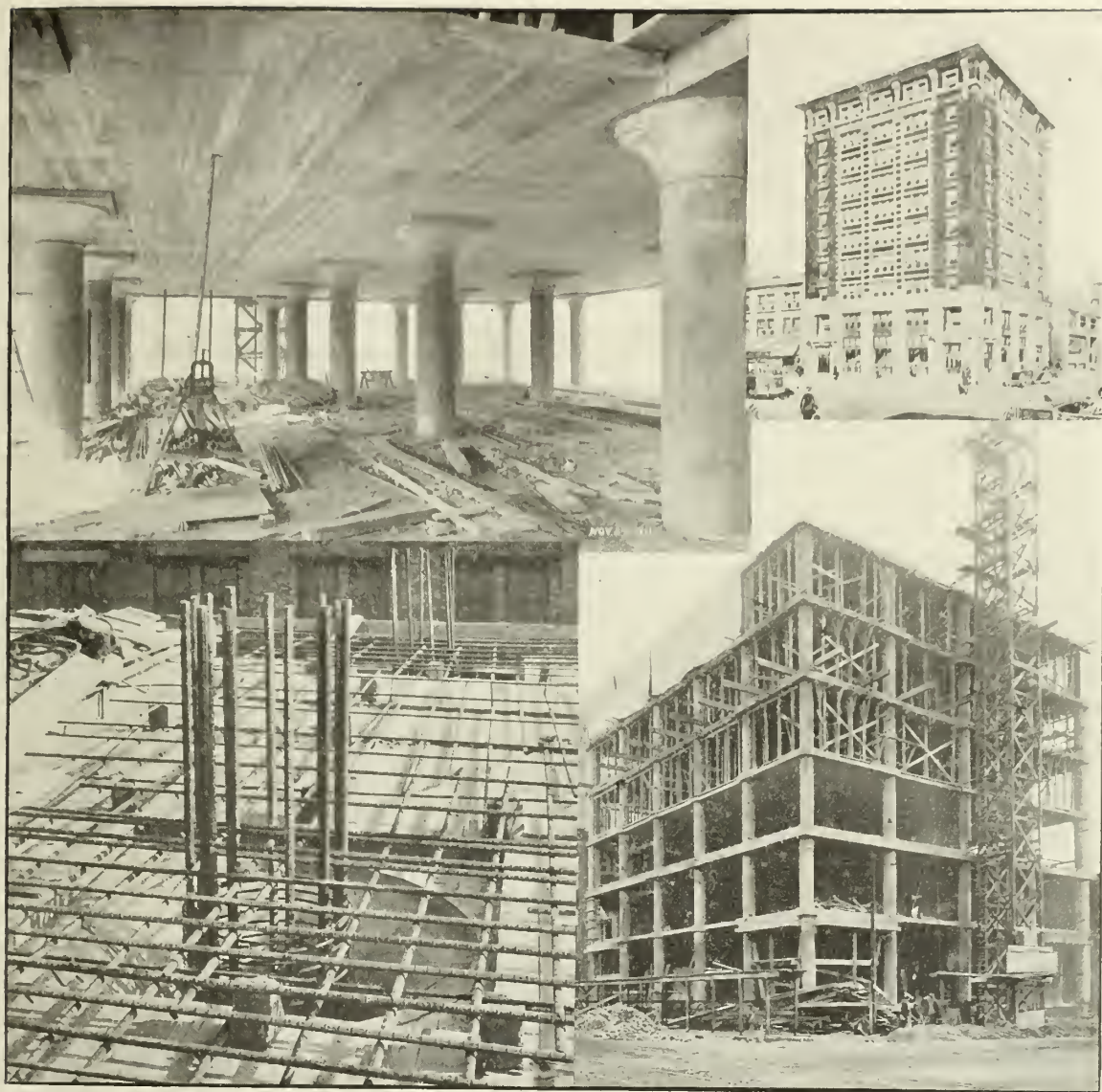
A Plurality of Faults.

Investigations seem to indicate that there were a great many things the matter with the Prest-O-Lite building in Indianapolis, Ind., which collapsed with a loss of ten lives December 6, 1911. The contractors on this job, Edward R. Wolfe and Chas. S. Ewing, have been fined \$200 on the technical complaint that they failed to secure a permit for a third story on the building which was erected after the permit for two stories had been granted. That is at the rate of \$20 apiece for human lives.

* * *

A Business Opportunity.

We are informed that there are in the entire country less than twelve factories making clay roofing tile. Doesn't this suggest a great opportunity for the manufacture and sale of concrete roofing tile and shingles? The day of the inflammable roof is passing—owners demand that the most vulnerable part of their buildings be protected.



Three Construction Views of New Sharples Building, Chicago, and a View as it Will Look When Completed

Many New Chicago Buildings of Concrete

Office Structures, Warehouses, Hotels of
Reinforced Concrete—Quick Winter Methods

BY MARC N. GOODNOW.

That Chicago is now experiencing one of the most remarkable developments in tall office buildings and warehouses, of any large city in the United States, is a significant feature of the increased use of concrete as a building material. Never before in the city's history, say those engineers, architects and contractors in closest touch with its marked advance, have cement and crushed stone played so prominent a part in building construction and never before has concrete proved itself so entirely satisfactory, not only from the standpoints of durability, strength and fireproofness, but from the standpoint of moderate cost.

The tendency on the part of firms requiring a large amount of floor space to leave the congested business district of the city and seek well lighted quarters with lower rentals, has resulted in this unusual architectural

growth and spreading out in the last year, more particularly within the last six months. In the central business district and its immediate environs old landmarks—relics of a rapidly vanishing method of construction—are being razed and new and greater structures are either projected or are now in process of construction on their sites. In the outlying districts, beyond the "loop," modern buildings, properly equipped and entirely fireproof in construction, are springing up at an unprecedented rate.

Naturally, the most notable feature of the new growth is the widespread use of concrete as a construction material, not only for its solidity and strength, but for its durability in point of years and its fire-resisting qualities. Many of these new office buildings and warehouses represent in a striking manner the most advanced type of business and industrial

buildings that are supplanting those erected only a decade or so ago, being far ahead of the older types in convenience, safety, durability and cost and, in fact, are far removed from the former "packing box" method of building.

Speaking of the great step forward which Chicago builders have taken in the use of concrete, a prominent engineer said:

"I know of nothing that so clearly marks the progressiveness and modernity of an American city as the use of concrete as the principal material in office buildings and industrial structures. Those of us who are connected with the architectural advancement of this city are justly proud, I think, of the advance Chicago has made particularly within the last year. In our growing use of cement wherever it has been possible, we have found nothing to offset almost any claim made in behalf of its use. Stricter regulations by ordinance with reference to eliminating fire-trap construction have had a good deal to do with its widespread use in the big buildings being erected nowadays, but its lasting qualities and its gradually moderating cost have been factors equally as important. In fact, we are getting to the point now where it is in extremely bad taste not to include the use of concrete wherever possible in specifications, to say nothing of being out of date and poor business sense. We are getting the cost of concrete down to such a point now that the saving in insurance makes its use a decided advantage.

Chicago is planning even greater things in the use of concrete than are shown by its buildings today. In the next year or two some features of the use of concrete in this city will come to light in such a way that they will be remarkable as compared with work now done.

New Concrete Buildings.

In this connection more than casual interest attaches to the new Sharples, the new Dwight Paper Co., the new Rand McNally, the Studebaker, the Peck & Hills, the Rogers & Hall, the McGuire hotel buildings and a dozen other similar structures and warehouses to be included within the same category. All these structures represent the very latest ideas in modern construction and the most advanced methods in the use of concrete. These buildings not only represent the newest ideas in concrete construction but several of

(Continued on page 61)

Good Concrete Is Worth a Good Price.

As to the contractor who insists upon doing cheap work, G. O. Sanders, Boston, Mass., writes CONCRETE as follows:

"There is too much desire on the part of many concrete contractors to do cheap work. Many of them seem to think that the value of concrete as a structural material depends upon its cheapness and not upon its durability, so they defeat its durability by making it too cheap.

"My attention was recently called to a sidewalk job. A reliable concrete man asked \$60 for putting

in a walk, the price to include taking out an old brick walk and doing a small amount of grading. Another man offered to do the work for \$30 and as the owner of the property is the owner of numerous tenements and other cheap buildings, he let the job to the lowest bidder. The cheap man, of course, agreed to do a first-class job, and when it was all done he still insisted that it was a first-class job. The man insisted that he had used a mixture of equal parts of cement and sand and thought that should bring good results, but as a matter of fact, I found he had used a large amount of ordinary dirt in place of sand, and he wondered why the concrete had not set perfectly in the three days which had elapsed since it was laid. The walk did not resist the pressure of the foot much more than ordinary sand would have done.

"In the first place the cheap man did not understand the first principles of concrete work, as there was no necessity for using a mixture of equal parts of sand and cement. If he had used good sand he might have used 1 part cement to 3 parts sand and it would have been stronger than a 1:1 mixture of sand and dirt, which he put into the mix. I found also that it had been cold enough to freeze the work after it had been laid and that no precautions had been taken against cold. There was not even a pretense of getting a smooth top on the walk.

"This is an extreme case of course, and the fault is with both parties to the bargain. In the first place it is bad judgment for a man to try to build up a concrete business by doing cheap work, and in the second place it is the worst kind of folly for the owner of or agent for property to give the job always to the lowest bidder, unless he has excellent reasons for believing that the lowest bid is high enough and that the bidder is a responsible person. A great many people expect to get a dollar's worth of concrete for fifty cents. Work like that which I inspected certainly hurts the builder so that he will find it hard to get other jobs, and it hurts the concrete business generally because many people are unable to discriminate between good concrete and bad concrete. It is the same in other kinds of work as in walk building. It is the contractor who keeps telling his men to put in a little more sand in the mixture who is the worst enemy of the business. He jabs his thumb against a concrete block made the day before and if his thumb is not hard enough to puncture it, tells his men to put a little more sand in the next day's mix.

"It is certainly true that people forget the price paid and remember an enduring piece of work. It pays a man to get a price high enough so that he can put the best kind of materials and workmanship into the job. When such a piece of work is completed it is always a good advertisement for his business. It is a good plan to pay a little more for good clean sharp sand than to put dirt into the concrete, which not only spoils the job on hand but stands for some time as an argument in the eyes of other people, against the use of concrete."

Record Attendance at New York Cement Show

General Public of the East Displays Lively
Interest in New Forms of Construction

Slowly the education of the East in the many and various phases of concrete construction proceeds. Reports from the Second Annual New York Cement Show in Madison Square Garden, Jan. 29-Feb. 3, indicate that architects, builders, engineers, home owners and public officials in the eastern states have been given a lot of new things to think about. Reinforced concrete has perhaps made faster and better progress in the East than elsewhere, but many of the small uses of concrete have had a late start there. Concrete block construction is in many eastern sections a comparative novelty. Concrete brick are just being introduced.

It is hard to estimate the value of any cement show so soon after the exhibition. That both of the eastern shows have done much to enlist the confidence of the general public in the uses of Portland cement is beyond question. The exhibitors at shows in new sections—parts of the country that have not had these exhibitions for more than a year or two—are inclined to underestimate their value. Exhibitors generally do business with architects, builders and engineers—men who are a part of the industry. These men generally can trace their interest in concrete to a growing demand on the part of their clients. So it is that it takes two or three years of hard, consistent work to create such a demand. The cement show does this.

Manufacturers of Portland cement, concrete materials and contractors' equipment find that buyers of their goods are not as much in evidence at the eastern show as they are at the Chicago show.

These manufacturers are inclined to discount the value of crowds composed largely of the great general public, who come in to see what is being done with cement. These visitors go away impressed. When they come to plan their new homes, factories, streets, public improvements and so on, they inquire about concrete. Then it is that the manufacturer of equipment and supplies receives the benefit. The show has created a demand for concrete construction which increases the market for the materials and tools necessary for handling concrete.

The New York show this year had fewer exhibits than it did a year ago. Although at this writing no figures are available that would show what the attendance was, it is safe to say that there was a larger and better class of visitors than there was last year. Many exhibitors didn't do the actual business at the show that they expected, but business conditions in the East might easily account for a considerable falling off in orders placed for machinery and supplies. Other exhibitors exceeded their show sales of last year. The manufacturers in this field who exhibit at the shows have learned not to gauge their value by the actual sales made on the exhibition floor. The influence of their ex-

hibit is felt in their sales departments for twelve months.

Casual Visitors Find Much of Interest.

The casual visitor who had no direct interest in mixers or material to be mixed, found more to interest him at this show than ever before. He found more exhibits of systems of construction. He was shown a great number of models of buildings built of concrete, concrete structures made moisture-proof. He found hundreds of architects' drawings illustrating the development of the new architecture—the architecture for which the material concrete is particularly appropriate. Much space was given to these exhibits, which were under the direct supervision of the show management. It's the same idea that was carried out at the Omaha show early this month. At Omaha the show management provided exhibits of concrete products, designed to attract the home owner, the factory owner and the public official. These men, who have a great indirect influence upon the demand for machinery and materials, are more interested in the completed product than they are in the tools and the machines. We wouldn't be surprised if next year we should see more attention paid to this feature by the management of the shows.

One feature of the New York show appealed forcibly to the workers in the industry who were there. That was the number of exhibits of firms who manufacture waterproofing and decorative products for use in connection with concrete. It is probable that more of these products are made in the East than in any other section of the country. The big paint and asphalt manufacturers have met the demand for waterproofings, coatings and stains that has grown up with the growth of concrete construction. These firms had interesting exhibits which served the dual purpose of interesting the building owner and holding the attention of the builder.

Elaborate Decorations.

One could not help but notice the absence of some of the largest manufacturers of batch mixers. Without referring to records we are pretty sure that the number of batch mixers on exhibition this year was far smaller than at the first eastern show. And, as generally happens, those engineers and contractors who were in attendance were anxious to investigate the batch mixer proposition and found only three or four of the old established batch mixer concerns represented. The continuous mixer manufacturers were much in evidence, most of them with new models which, they are confident, will appeal strongly to buyers of concrete handling equipment.

The decorative scheme adopted by the show management was an improvement upon that used last

year, though the plan followed a year ago was thought to set a mark that would not easily be reached again. An immense curtain hung at each end of the garden and the steel girders under the roof were obscured by a canopy of cloth. The significant feature of the decorations was the almost total absence of wood. The booths were constructed of material coated with concrete. The concrete was made of Portland cement and a special aggregate which gave it the appearance of real granite. These fixtures were built in the shop of Contractor Gordon, in Chicago, and shipped knock-down to New York. Twenty-five freight cars were required for shipping the material. After the New York show the booths were taken down and re-packed in cars. The same booths will be used at the Chicago and the Kansas City show. It is essential that the initial cost of manufacture of these booths and their embellishments approximated \$25,000.

One of the exhibits provided by the show management included a section of the Temple of Romulus in the Roman Forum. This section is an excellent example of concrete as used by the Romans and is the property of Architect Albert Hopkins, New York City.

The show closed Saturday night, Feb. 3, and most of the exhibits were placed on board a special train which will take them to Chicago where they will appear in the Coliseum Feb. 21-28, during the Chicago Cement Show.

TENTATIVE PROGRAM FOR KANSAS CITY CONVENTION OF N. A. C. U. ANNOUNCED.

Papers embodying a wealth of material as to the developments of the year in the knowledge of concrete construction are scheduled for presentation at the Eighth Annual Convention of the National Association of Cement Users to be held in Kansas City, Mo., March 11 to 16.

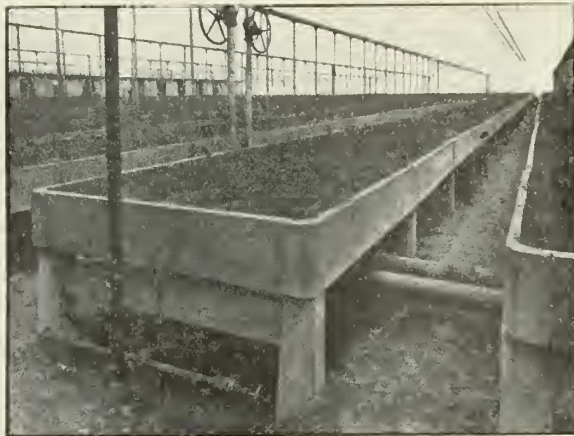
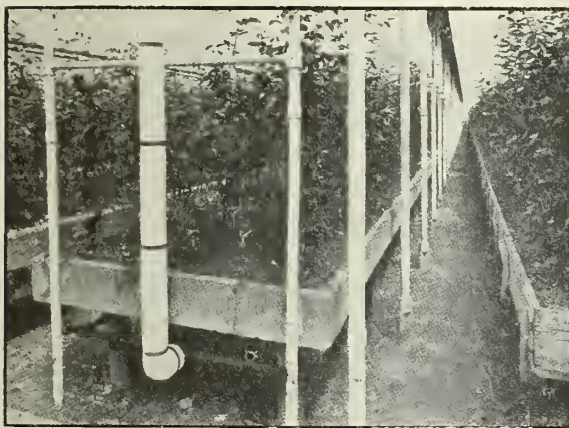
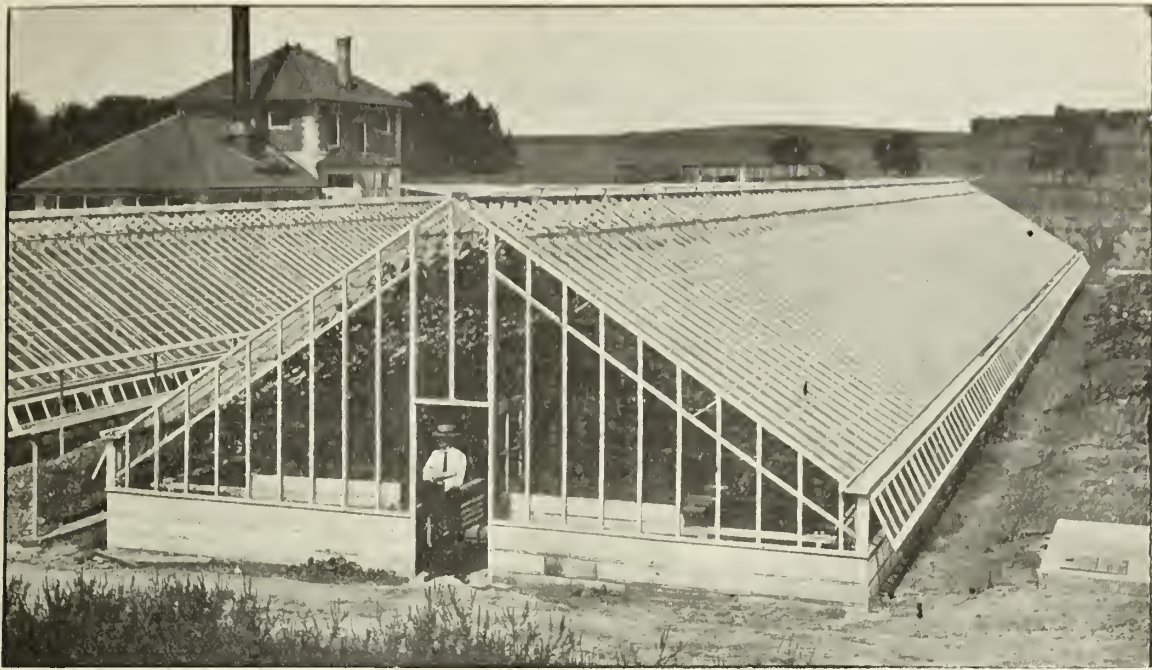
The convention is something which the seeker after knowledge, in no matter what branch of the industry, cannot afford to neglect. The dates have been so arranged that delegates may attend the First Annual Cement Show of the Cement Products Exhibition Co., in Kansas City, March 14 to 21. A large attendance is therefore anticipated. The tentative program, as announced by President Richard L. Humphrey, speaks for itself, as follows:

- "Concrete Highway Bridges." Walter Scott Gearhart, Highway Engineer, Extension Dept., Agricultural College, Manhattan, Kans.
- "The Dallas Oak Cliffe Viaduct." Ira G. Hedrick, Consulting Engineer, Kansas City, Mo.
- "Flat Slab Bridges." W. H. Finley, Assistant Engineer, Chicago & Northwestern Railroad, Chicago, Ill.
- "An Improved Concrete Pavement." E. W. Groves, City Engineer, Ann Arbor, Mich.
- "Cement Paving as Constructed at Mason City, Ia." F. P. Wilson, City Engineer, Mason City, Ia.
- Report of Committee on Roadways, Sidewalks and Floors. C. W. Boynton, Chairman.
- "The Use of Cement in Irrigation Work." F. H. Newell, Chief Director, U. S. Reclamation Service, Washington, D. C.
- "Reinforced Concrete in Agriculture." W. A. Collings, Engineer, Builders Material Supply Company, Kansas City, Mo.

- "Methods of Testing Sewer Pipe." Duff A. Abrams, Assistant Professor, Engineering Experiment Station, University of Illinois, Urbana, Ill.
- "Advantages and Durability of Cement Sewer Pipe." Gustave Kaufman, Engineer, The Wilson & Baillie Manufacturing Company, Brooklyn, N. Y.
- "Reinforced Concrete Water Purification Works." Dr. Walter M. Cross, City Chemist, Kansas City, Mo.
- "The Control Beam as a Field Test for Concrete." Fritz E. von Emperger, Consulting Engineer, Vienna, Austria.
- "Continuous Concrete Beams." Dr. E. Probst, Consulting Engineer, Professor, Royal Technical High School, Berlin.
- "Notes on the Deformation in the Webs of Rectangular Concrete Beams." H. C. Berry, Assistant Professor of Materials of Construction, University of Pennsylvania, Philadelphia, Pa.
- "The Design and Construction of a Reinforced Concrete Dome, 220 Foot Span." Dr. S. J. Trauer, Chief Engineer, Breslau, Germany.
- "The Design of Reinforced Concrete Domes." H. Brussel, President, Reinforced Concrete Company, St. Louis, Mo.
- Report of Committee on Reinforced Concrete and Building laws. A. E. Lindau, Chairman.
- "The Construction of Concrete Grain Elevators." John S. Metcalf, Consulting Engineer, Chicago, Ill.
- "The Design of Concrete Grain Elevators." E. Lee Heidenreich, Chief Engineer, Builders Material Supply Company, Kansas City, Mo.
- Report of Committee on Measuring Concrete. Robert A. Cummings, Chairman.
- Report of Committee on Nomenclature. Peter Gillespie, Chairman.
- Report of Committee on Specifications and Methods for Concrete Materials. Sanford E. Thompson, Chairman.
- Report of Committee on Treatment of Concrete Surfaces. L. C. Wason, Chairman.
- Report of Committee on Insurance. W. H. Ham, Chairman.
- "The Handling of Concrete in the Construction of the Panama Canal." S. B. Williamson, Engineer, Pacific Division, Panama.
- "Concrete Piles and Harbor Work." Dmitri Alexeev, Engineer, Russian Northern Railway, Moscow, Russia.
- "Methods of Construction Used in the Arbuckle Building, Brooklyn." R. C. Wilson, Assistant Engineer, Turner Construction Company, New York, N. Y.
- "Construction of the Hollow Reinforced Concrete Dam of the Portland Railway Light and Power Company." Robert S. Edwards, Consulting Engineer, Portland, Ore.
- "Discussion of Advantages and Comparative Cost of the Hollow Concrete Dam." W. L. Church, President, Ambursen Hydraulic Construction Company, Boston, Mass.
- "The Construction of the Fireproof Type of School House with Separately Molded Members." Theodore H. Skinner, Architect, Oneida Community, Ltd., Oneida, N. Y.
- "Discussion of the Use of Calcium Chloride as a Preventive from the Freezing of Concrete." Richard K. Meade, Chief Engineer, Tidewater Portland Cement Company, Baltimore, Md.
- "Some Notes on the Value and Comparative Cost of Reinforced Concrete Telegraph Poles." George Gibbs, Chief Engineer of Construction, Pennsylvania Railroad, New York, N. Y.
- "Concrete Fence Posts." W. J. Towne, Assistant Engineer, Chicago & Northwestern Railroad, Chicago, Ill.
- "Reinforced Concrete Telegraph Poles." Robert A. Cummings, Consulting Engineer, Pittsburgh, Pa.
- Report of Committee on Building Block and Cement Products. P. S. Hudson, Chairman.
- "The Concrete Block Industry in Russia." Alexander Zuberbuhler, Engineer, Moscow, Russia.

Officers of the Association feel that the success of the banquet in New York last year was such as to indicate the great desirability of having a similar one at Kansas City. This has been arranged for Friday evening, March 15, and the speakers will be

(Continued on page 91)



Above—Greenhouses with Concrete Block Walls at Barberton, Ohio; Below—Benches of Concrete in Poehlmann Greenhouses, Chicago

Concrete Valuable in Greenhouse Construction

Concrete Lumber Successfully Used to Make Plant Benches in Unit Lengths

The value of concrete in greenhouse construction is becoming generally recognized. The most enduring of wood lumber used in bench construction lasts but a very short time under the influences of decay which are constantly at work in the moist condition of a greenhouse. Greenhouse benches are now being made of concrete lumber and are proving very satisfactory, as they are not particularly expensive, are readily constructed and may be expected to last indefinitely.

The greenhouses of the Poehlmann Brothers Co., Morton Grove, Ill., cover approximately thirty-seven

acres. The greenhouses are built 27' wide and there are 37,800 linear feet of these houses. In this immense flower factory, where 300 men are employed, lumber at one time was used exclusively in the construction of benches, but even cypress would last only a few years, so the company began experimenting with the use of concrete. At first only the posts were made of concrete to support the wooden benches. In the greenhouses of the George Witthold Co., Chicago, benches were made 250' long and 5' wide and are very satisfactory except that they cannot be moved. Poehl-



Building a Bench of Concrete Lumber

(Continued on page 64)



Concrete and steel pavilion, Como Park, St. Paul, Minnesota.

Christian Science Tabernacle, in Old Spanish Mission style, of reinforced concrete at Spokane, Washington.

Houses of Mrs. Alice Miller, Deal Beach, New Jersey, of Atlas white Portland cement stucco on metal lath.



Reinforced Concrete Pavements Serviceable

Work Done in Highland Park, Michigan,
at a Comparatively Low First Cost

Street paving of reinforced concrete is comparatively new. Some of it was laid in Highland Park, an attractive residence suburb of Detroit, Mich., in November, 1910. The same year reinforced concrete paving was laid in Fond du Lac, Wis., and in Plymouth, Wis.

George Jerome, Detroit, who is engineer for the village of Highland Park, would not recommend plain concrete paving and insisted that reinforcement be used. Mr. Jerome believed there was some uncertainty in plain concrete paving. An instance

son Highland Park used reinforced concrete on streets where it was desired to escape a heavy paving assessment on comparatively new residence streets.

It has been pointed out in *CONCRETE* frequently that plain concrete pavements may be good pavements or not, depending upon the specifications and upon the care that is exercised at every stage of the operations to see that the specifications are followed. Plain concrete has given seventeen years of good service in some cases and there is every reason

to believe that much of the plain concrete put down more recently will last a much longer time because of much improved methods and the much wider knowledge of the essentials in making good concrete. It was pointed out in the January, 1912, issue of *CONCRETE* that in the many miles of concrete roads laid by the Board of County Road Commissioners of Wayne County, Mich., there are less than seven-tenths of one per cent of cracked 25-foot sections.

Whether to use reinforcing or not is a question which can be answered in individual cases only. Much depends upon sub-grade conditions as well as upon the service which the

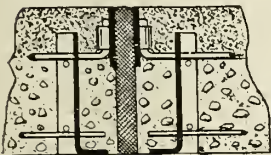
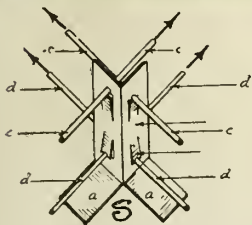


Fig. 1.

The illustrations from photographs show: Placing the fabricated reinforcing in street; a finished pavement in Highland Park, Michigan, and at the bottom, work in progress. Concrete carts ride over the reinforcing bars on the bridge shown.



had just come to his attention about that time in which plain concrete had cracked. That is the rea-

son street is expected to give in the matter of traffic. A. O. Thomas, the inventor of a system of pave-

ment reinforcing, declares that reinforcing makes it possible, just as in other construction, to use less concrete than in a plain slab.

Two miles of reinforced concrete were put down on the Fond du Lac streets in 1910 under the supervision of J. C. McCullough, city engineer. Specifications for 10,700 square yards laid in Plymouth the same years were prepared by W. G. Kerchoffer, Madison, Wis. Reinforced concrete pavements recently have been put down in Sheboygan, Wis., un-

to the job ready to be put in place on its supporting "stools."

These little stools constitute the main idea of the system. They are simply made of 1" angle iron, split at the bottom and the two bands bent outward at right angles with the upright portion, to form feet which rest on the subgrade. The angle iron is punched as shown in Fig. 1 to make small lips over the openings through which the reinforcing bars extend. These lips are forced down after the bars

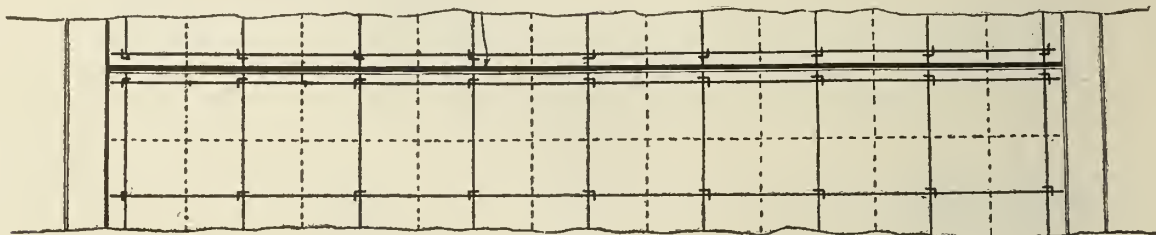


Fig. 2

der the direction of the city engineer, C. U. Bowley. Pavements in these three cities vary only in mixtures used and thickness of base and wearing surface. The pavement is all two-pour work and is reinforced with triangular mesh woven wire manufactured by the American Steel & Wire Co.

The Highland Park pavement specifications, which were drawn by George Jerome, provide for a 5" base of 1 part cement, 3 parts sand and 6 parts crushed limestone, smaller than $1\frac{1}{2}$ ", and a 2" wearing surface of 1 part cement, 1 part sand and 3 parts crushed granite or trap rock, of which 50 per cent is of $\frac{1}{4}$ " size, 30 per cent of $\frac{1}{8}$ " size and 20 per cent of $\frac{1}{16}$ " size.

The specifications provide that $\frac{3}{8}$ " and $\frac{1}{4}$ " round steel bars be used for reinforcement placed, to quote from the specifications direct, as follows:

"The $\frac{3}{8}$ inch round steel bars to be placed longitudinally and crossways 2-feet center to center and $1\frac{1}{2}$ inches from the top surface of the finished concrete; each system of bars to be well clamped together at the intersections; the $\frac{1}{4}$ inch round steel bars to be placed longitudinally and crossways 4 feet center to center and 5 inches from the top surface of the finished concrete, and both systems of bars to be well clamped together at their intersections. The two meshes are to be properly supported in their respective places before any concrete is laid, and in proper lengths and widths so as to be embedded in concrete panels 30 feet long and of the width of the road. The steel bars are to be supported and kept in place by Thomas steel fasteners* or some other equally effective device."

Armored expansion joints are placed every 30' throughout the length of the pavement. In the Highland Park work the Baker expansion joint, like that described in CONCRETE in connection with the county road work in Wayne county, Mich., was used. Joints are filled with asphaltic tar.

The reinforcing used in the Highland Park streets is fabricated by the manufacturers and goes

are in place and thus grip the reinforcing members securely. Referring to Fig. 1, S indicates the stool; a the feet; two sets of reinforcing bars are marked c and d, and b marks the little "lip" device which holds the bars.

When a section of the fabricated reinforcement is in place an inclined platform supported by short legs at one end is used for a runway for the concrete cart so that it will not touch nor disturb in any way the reinforcing.

The pavement described was laid on Richton avenue in Highland Park in November, 1910. It was late in the season before the work was completed and frost had to be contended with by using straw liberally over the street as fast as the concrete work progressed.

In all this work the top dressing was put on immediately after the base was laid and tamped.

The Richton pavement gave such satisfaction at such a low cost compared with other inferior pavements with which the taxpayers had had experience that the same specifications were followed on three more thoroughfares, Gerard, Grand and Buena Vista avenues.

The pavement cost, exclusive of curbs, sewers and engineering and inspection service, was \$1.57 per square yard. The entire cost, including all items, was \$2.11 in the case of the Richton avenue work and \$2.12 for the other streets. Similar pavements have been put down in Hamtramck, Mich., a manufacturing suburb of Detroit. The cost \$2.12 is given because the taxpayers have to pay for the sewer work, the engineering service and so on all in one assessment, whereas in cities where the sewer work and the engineering work are otherwise provided the assessment is on a different plan. The pavements described are 24' wide. Fig. 2 gives a section view of the expansion joint under the Thomas system and Fig. 3 shows the plan of the reinforcement in place.

*Thomas Steel Reinforcing Co., Detroit, Mich.



Section of Fence on O. C. Barber Farm, Barberton, Ohio

Concrete Fences Are Attractive and Permanent

More Than Five Miles of Fence Built of
Concrete Posts and Rails on Ohio Farm

Concrete is a valuable material in the construction of walls and fences, not only for permanence but for beauty. Attention is called to three illustrations* on page 37 showing the walls and fences on the estate of O. C. Barber, near Barberton, O. Two of these views are of a wall built of concrete block and special concrete stone at the sides of an approach to a bridge and on the bridge itself. Something more elaborate in fence construction is shown on this page through the courtesy of the Universal Portland Cement Co. This is a fence surrounding the home of F. W. Clifford, Minneapolis, Minn. The design is by Harry W. Jones, architect, and the fence was built by the National Stone Co., Minneapolis, Minn. The lower part of the fence and the pillars are of concrete block cast with a rough grained surface, laid in cement mortar with pointed joints. The upper part is cast in a special pattern and there was no attempt at surfacing after the pieces left the molds.

Particular attention is called to a view of a long line of fence on the Barber estate. This is built of reinforced concrete posts with slots in the sides to receive the reinforced concrete rails. A view of a small section of the fence reproduced on this page gives an idea of the pattern of construction. This fence of posts and rails was designed by S. H. Wightman, when he was in charge of the O. C. Barber block plant, at Barberton. Mr. Barber was considering the erection of several miles of wire fence on his farm and Mr. Wightman persuaded him, by means of a model of a section of the proposed fence of concrete, to use concrete. Mr. Barber built five and one-half miles of this concrete fence. In casting the 30,000 rails which they used, only four molds were employed. The rails are 2" x 10" x 8' 7½". Only two wooden molds were

required for the posts. The posts are 8" x 10" x 8'. The post caps were cast in gang molds. An idea of what this fence will cost in almost any locality may be gained from the information supplied by Mr. Wightman as follows:

Labor for molding the rails cost \$1.90 per day and \$1.75 for a helper. Forty rails a day were cast by each team. The caps were made by piece work and cost 2½ cents each for molding.

Thirty posts a day were made by a molder at \$2.50 per day and a helper at \$1.75. The rails are reinforced with two ½" twisted Franklin bars, and stood 2,363 pounds uniform nonbinding load when laid flat resting at each end on a block 1" high. Under this test the post did not break but sagged until the center touched the floor, when loading was stopped.

The cost of the fence, per running foot, piled in the yard, was 28 cents. All pieces are faced light gray and thoroughly water-proofed.

The work of building the fence was done by a crew of fifteen men at \$1.75 a day each, with one team of horses and a foreman at \$2.75 a day. Mr. Wightman is of the opinion that the work would have been done more economically if a better foreman at a higher price had been employed. This gang of sixteen men erected 280' of fence per day at a cost of 15 cents per foot, making the total cost of the fence 43 cents per foot—erecting the five and one-half miles for \$12,487.20.

Posts were set 38" in the ground and filled in around the base with a concrete mixture of gravel and sand, using one-third of a bag of cement in setting one post. Mr. Wightman calls attention to one error in construction. In putting in spacers after setting the rails in the slots, wooden spacers were left in and



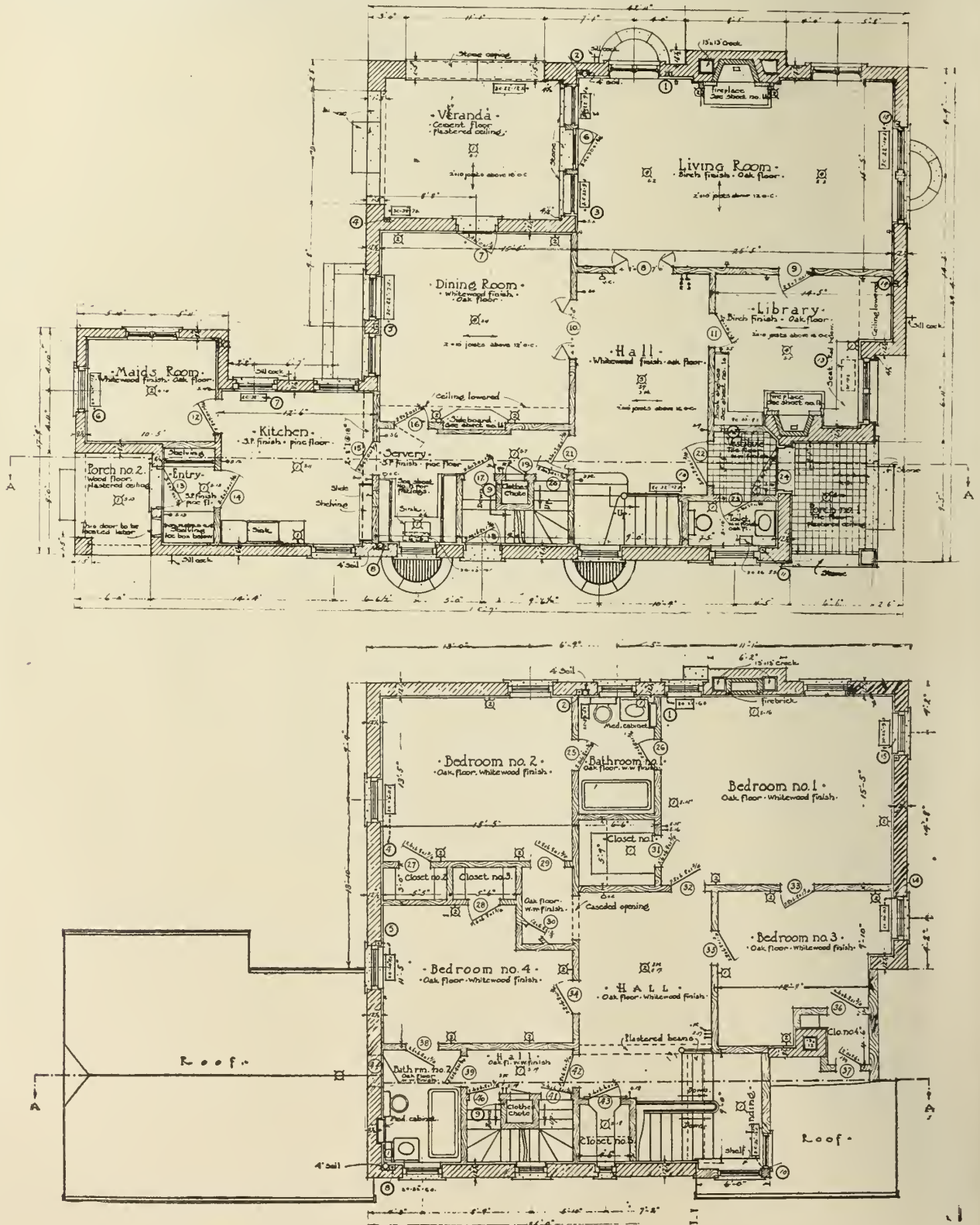
Concrete Fence in Minneapolis

*Courtesy Ideal Concrete Machinery Co.

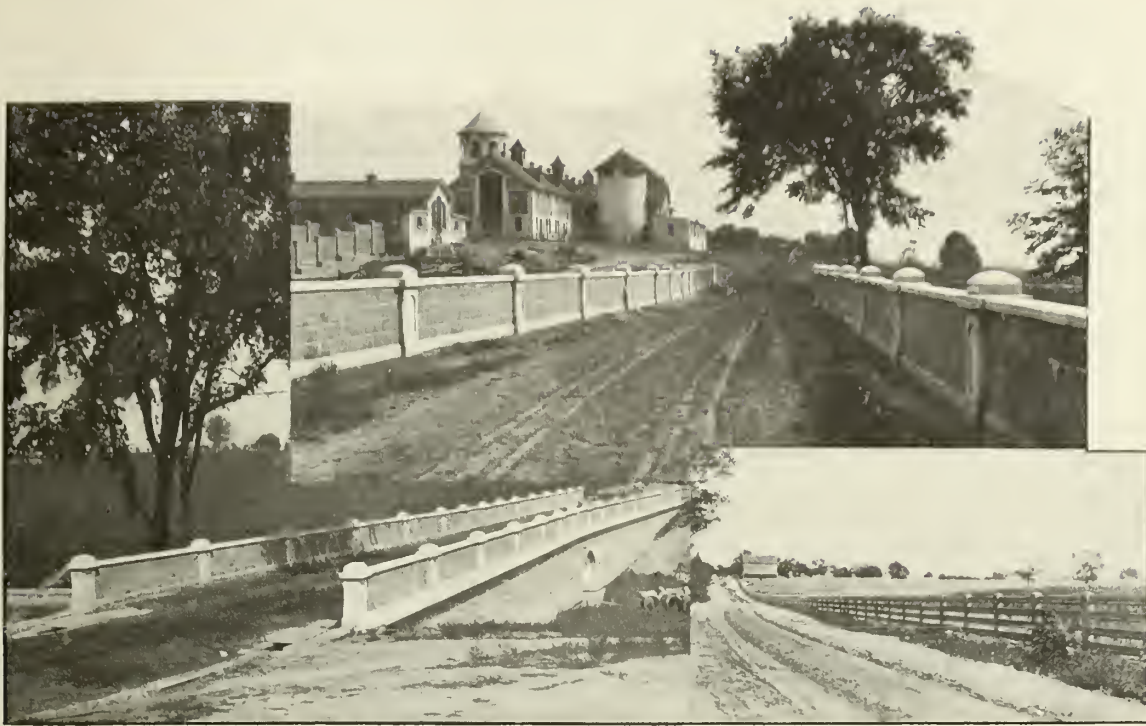
Floor Plans of House Built for about \$9,000

The floor plans on this page and the illustration from a photograph on the opposite page give an excellent idea of a house built in Detroit, Mich., with masonry walls and stucco surface for about \$9,000. Burrowes & Wells are the architects. The

walls are carried up above the roof and are capped with a stone coping. There are decorations, cemented to the wall just under this coping, of dark green tile. Rooms on the third floor not shown in the plans also are finished.



First and Second Floor Plans—Scale 1/4" = 1'



Above are two views of a wall of concrete block and special concrete stone and a fence of concrete posts and rails—all on the farm of O. C. Barber, Barberton, O. See article on page 35.



Above is shown the building of the Sunset Publishing Co., San Francisco, Cal. It is of mill construction with exterior walls of stucco on Hy-Rib, plastered outside and back-plastered within. George W. Kelham is the architect; C. P. Moore Building Co., contractors.

At the left is a Detroit, Michigan, residence, with rough-cast stucco walls, designed by Architects Burrowes and Wells. Floor plans are shown on opposite page.



The Machine

THE HOBBS Concrete Block Machine is the latest and best. It is a down face, wet process machine. Makes hollow, two-piece or veneer block and is either a 16, 20 or 24" machine whichever you prefer.

What About the Hobbs Machine

The Hobbs has been on the market a little over a year. Today we believe it has the largest sale of any block machine. Of the last 100 machines sold, 95 were bought by men already in the business and every machine was sold under a legal guaranty to give the customer his money back if he was not entirely satisfied. Does this mean anything to you? Could we make such a guaranty, if we were not absolutely sure that the Hobbs would make good?

Why This Success

Composition instead of iron face plates, a range of over 2,000 distinct sizes of block, automatic acting dividing plates which make the Hobbs the fastest block machine made, and scientific and high grade construction tell the story in a nut-shell. And these features make possible and practical the building of REAL BROKEN ASHLAR which slowly but surely is revolutionizing the block business. To have a machine for Broken Ashlar and still be able to make common blocks on it rapidly and well, mean success.

Composition Rock Face Plates

If you knew as much about Composition Plates as Hobbs customers do our competitors would go out of business. It is a



physical impossibility to cast in iron a natural rock face plate but Hobbs Composition Plates are a cast taken direct from the natural stone and the impression is ABSOLUTELY PERFECT.

Think of it! A perfect rock face with the sharp edges, the lights and shadows and the rift of natural stone is produced just as easy and just as cheap as the "bum" rock face made with iron plates.

2000 Distinct Sizes of Block

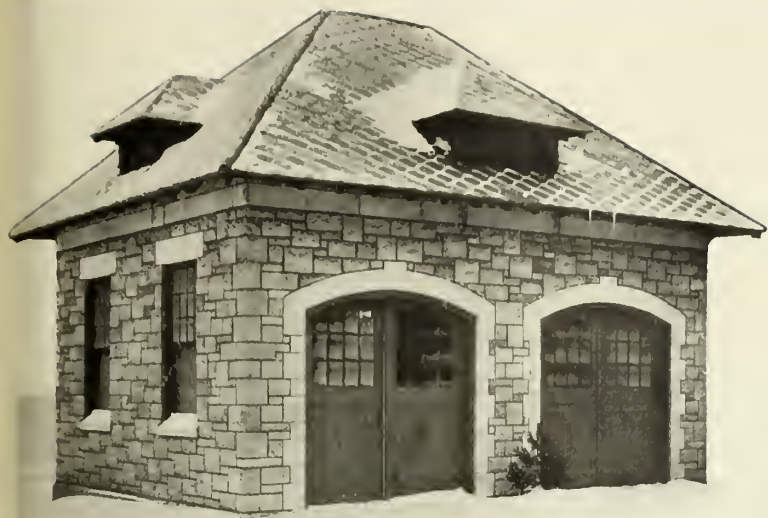
Variety is the spice of life. You positively cannot get the good paying jobs from the architects and high class builders if you make one or two sizes of blocks only. You have got to give them variety and when you own a Hobbs you can do so. The largest Hobbs block is one foot square and two feet long, the smallest is a 3-inch cube. There is no size between that you cannot make easily and practically. In this respect the Hobbs is a marvel of mechanical ingenuity.

Automatic Acting Dividing Plates

Somebody said: "Variety of sizes is all right but odd sized blocks cost too much." True, they do when made with the old-fashioned machine, but they don't with the Hobbs. We make and back up this

THE HOBBS CONCRETE

933 Scotten Avenue



The Hobbs on exhibit at Cement shows in New York, Omaha, Chicago, Kansas City

statement that you can with a Hobbs make as many cubic feet or pallets full of fractional block in a day as you can whole block and at no greater expense. The more you know about other machines the more you can appreciate this.

High Grade Construction

Just the minute you see the Hobbs you know it was not built in a foundry. There is scientific design to the Hobbs and it shows plainly the work of the talented mechanical engineer and the skilled machinist. A block machine that is adjustable to make over 2000 sizes of block, make every block absolutely true to size and yet not have a single change that requires more than five minutes to make must be built accurate. You must pay for this, of course, but did you ever in your life regret buying good tools?

Real Broken Ashlar

Mr. Rupp of Reading, Pa., was discouraged. He used the best cement and materials but he could not sell his block. Then he bought a Hobbs. He used exactly the same material as before but he tamped it face down on the Hobbs Composition Face Plates and made 18 distinct sizes of the perfect rock faced block so

Its Work

THIS GARAGE of Real Broken Ashlar work with granite facing was made with a Hobbs for 24c per square foot by the Central Stone Co., Utica, N. Y., Agne, Rushmer and Jennison were the architects.

produced and set up a sample wall in Real Broken Ashlar. Inside of three months his plant was working day and night.

A Letter from an Architect

Hobbs Concrete Machinery Co.,
Detroit, Mich.,

Gentlemen:—The broken ashlar work that has gone in several of my late buildings through Mr. Rupp has surpassed anything I have ever used before. The cuts in the blocks are as near stone as it is possible to make, and after all this is the prime factor in cement block.

I might add that Mr. Rupp is very successful in other sections with work for other architects and I think is building up a trade that is a credit to all concerned.

Very truly yours,
(Signed) HARRY MAURER.

Good Advice

Before buying any other block machine or continuing to use your old equipment, for your own good find out first if the Hobbs is all that we claim. It will pay you to send for our catalog. It is honestly written and every claim is backed up with a "money back" guaranty. Have you an impulse to send for this book? Then DO IT NOW.

MACHINERY COMPANY

Detroit, Michigan

Build Model Concrete Village for Coal Miners

Work Being Done at Truesdale Mines an
Example in Sanitary Housing of Operatives

A model, concrete town for miners is being built near Scranton, Pa., by the Delaware, Lackawanna and Western Railroad.

The conditions under which many miners dwell are notoriously unfit and the concrete village will spring up as a shining example of what may be done.

This village, now under construction, is adjacent to the Truesdale mines, at Nanticoke, Pa., where miners have been housed under conditions sufficiently unsanitary to bring the matter of their welfare to the attention of E. E. Loomis, of the Lackawanna railroad. He is deeply interested in the new house-building operations and in bettering the conditions of operatives in every possible way.

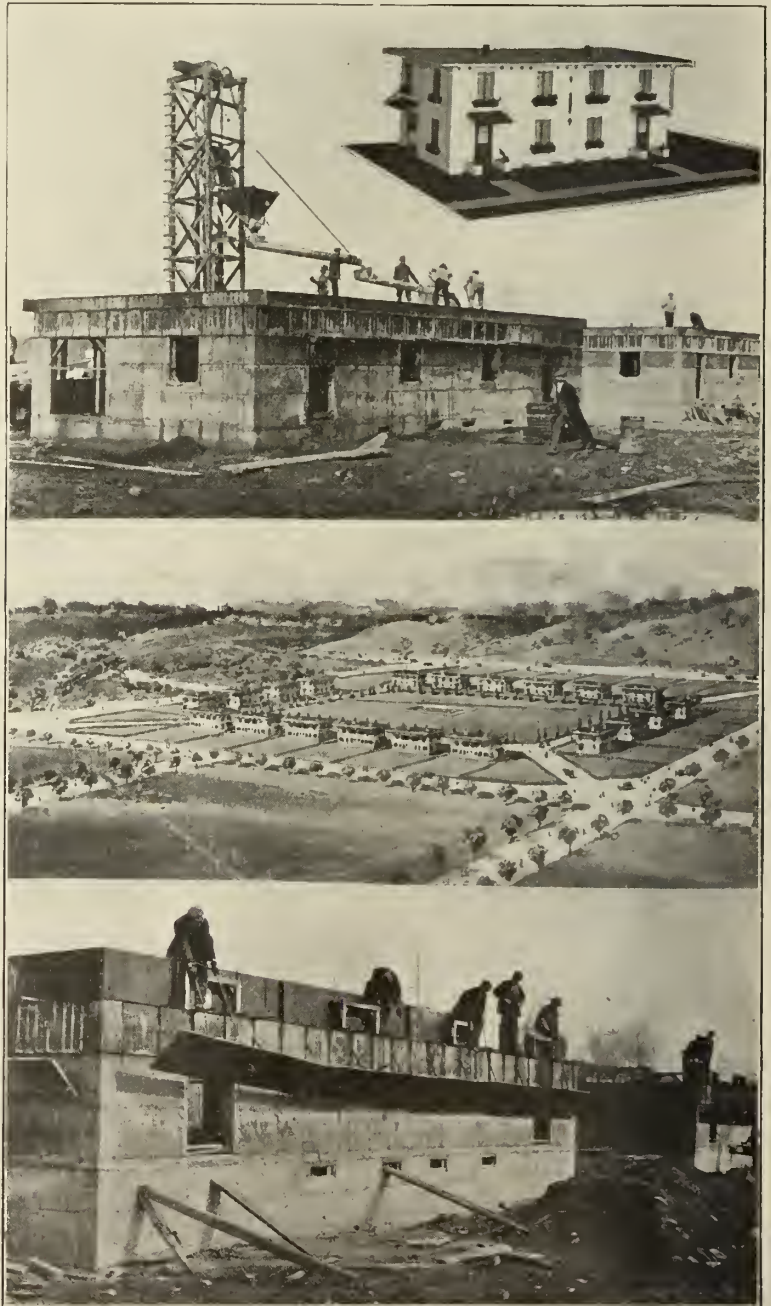
The plan of the settlement, with houses ranged around a park 300' x 600', and also a model of a typical house are shown among the illustrations. The plans are by Milton Dana Morrill, whose patent wall forms* and construction methods are being used.

The houses are double and each half has six rooms—living room, dining room and kitchen on the first floor, besides porch intended for a summer kitchen, and three bed rooms on the upper floor, besides ample closet space and a sleeping porch. The estimated cost of each of these double houses is \$2,600, so that the whole investment in 20 houses, with apartments for 40 families, is to be about \$52,000. These houses are being built under very favorable conditions—with practically all materials, except cement, right on the premises.

The general scheme, as is suggested by the illustration made from a drawing of the whole proposed settlement, is for some attractiveness in landscape as well as the best of sanitary conditions for the houses. In this latter connection it is proposed to build the houses so that housecleaning will be a business chiefly for the garden hose. Window boxes are not merely an embellishment which the architect has given to the model illustrated. They are actually to be provided, it is said, so that the occupants of the houses may make their homes more beautiful with a touch of color here and there. In the court, which the houses surround, space will be allotted to each family for vegetable and flower gardens.

The idea in both design and construction has been worked out to bring the substantial fireproof home within the reach of the wage earner. It is interesting to know that for the construc-

tion, products which have been regarded as waste have been utilized. The buildings are of a mixture of coal cinders, sand and cement, poured into the steel forms which are set up forming the walls, partitions, floors and roofs. The system has already been described in CONCRETE in connection with



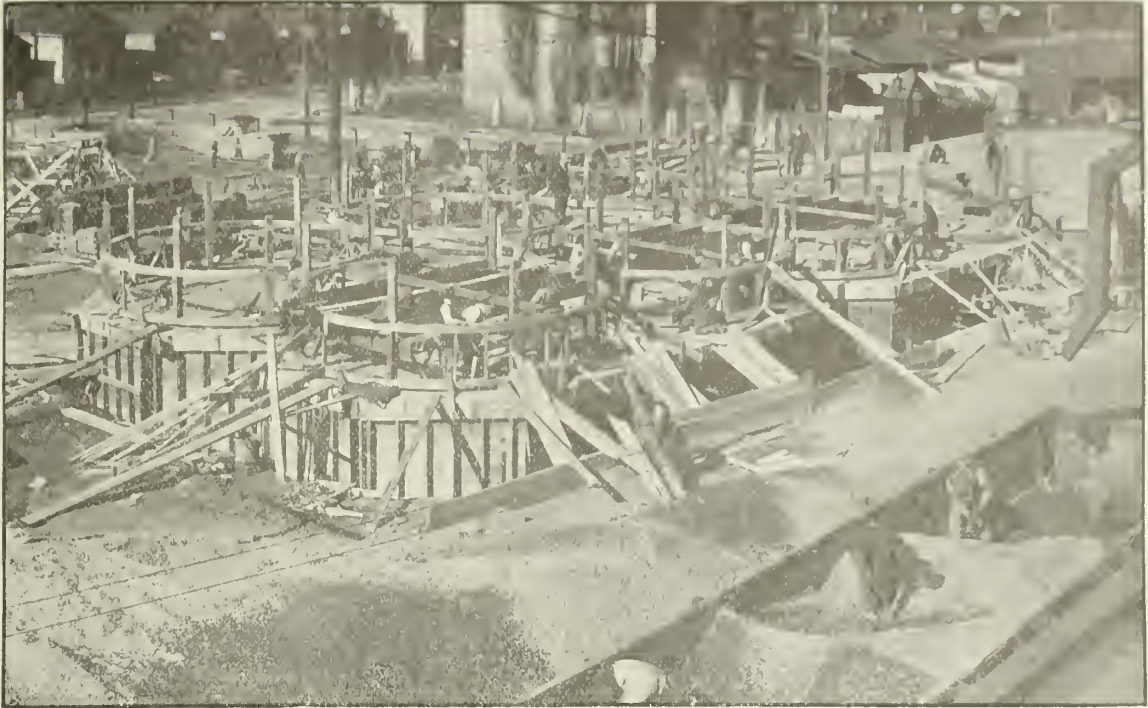
At the top, illustration from model of house for miners; pouring concrete by chute from tower mounted on flat car; plan of the village; lifting forms to place

houses erected at Virginia Highlands, near Washington, D. C.* The same forms are used for the

(Continued on Page 66)

*Read & Morrill, Inc., 179 Joralemon St., Brooklyn, N. Y.

*December, 1910, issue of CONCRETE.



Form Work in Progress on Elevator Bins

HOW FORMS WERE HANDLED ON CYLINDRICAL GRAIN BINS.

BY G. D. CRAIN, JR.

Concrete has been making its way to a larger and larger extent in the grain elevator field. Simplicity of construction, absolute protection from fire and the adaptability of the material to the special work in hand, all have aided in its progress, so that the cylindrical bin of reinforced concrete has become practically the standard in the construction of elevators.

The fireproof feature is one of the most important. Elevator fires have been numerous, and even when steel or galvanized iron is the principal material utilized the fire hazard is by no means eliminated. With reinforced concrete, however, the underwriters are willing to give about as low a rate as is ever granted, while some owners are so confident of their protection that they carry no insurance whatever on such elevators.

Some interesting construction features have been noted in the erection of a 16-bin addition to the plant of the Kentucky Public Elevator Co., Louisville, Ky. The bins are 7' high and 21' inside diameter. The walls are 7" thick, resting upon foundations with 18" walls. The capacity of the bins is 404,000 bushels. The cost of the work will be about \$100,000.

The Witherspoon-Englar Co., Chicago, Ill., designed the addition and besides erecting the bins will install the machinery, which will consist of belt conveyors operated from the power plant in the main building on the east. Three tunnels have been provided connecting the new bins with the old plant, while an overhead bridge will give additional connections.

The reinforcing consists of $\frac{1}{2}$ " corrugated bars, spaced 7" on centers. This is the horizontal reinforcing. In addition $\frac{3}{4}$ " bars are placed vertically 13' apart. Standard gas pipe, $1\frac{1}{4}$ " in diameter, was used

in connection with the forms, and this too remains as reinforcing.

Before work on the elevator proper was begun, 628 reinforced concrete piles were driven by the Raymond Concrete Pile Co., under a subcontract which was let by the Witherspoon-Englar Co. The reason for using the piles is that much of the ground over which the grain bins are being erected is filled, and the piles were driven so as to furnish a foundation which could be depended upon. The work on the elevators is still in progress although nearly complete.

Care to Prevent Freezing.

The concrete is mixed in the 1:2:4 proportions, and is hoisted to the level of the forms, being poured from concrete buggies, no sluices being used. Steam was run into the sand and gravel piles before use, and hot water was used in the mixture, so that the concrete was poured in a warm condition, setting, except in the coldest weather, without difficulty. The main trouble was from the tendency of frost to make the concrete adhere to the forms. Boiling water was used with good results in thawing this out and enabling the work of raising the forms to proceed.

This work of raising the forms constituted the chief feature of the structure. The forms were of galvanized iron, yoked together by means of wooden joists. With the aid of jacks they were raised without being taken down, so that the form which was used in pouring the first of the 4' sections did the work throughout the entire period of construction. The forms were tied to the gas pipe referred to above, this being embedded in the concrete and extended as the work proceeded. Rusted pipe proved best, as it did not slip easily and enabled the jacks to take a firm hold.

Eight jacks were placed on each tank. Each jack was operated by two men. As soon as the concrete

had begun to set, the work of raising the forms was begun, care being taken to see that the lift was applied simultaneously by the eight teams operating the jacks. Each lift raised the form $\frac{3}{4}$ ", and unless the concrete was setting more rapidly than the average, all of the other fifteen forms were raised the same distance before the gang returned to the first.

In this way the forms were raised only gradually, but often enough to prevent the concrete from adhering to the forms, and thus to permit the raising process to be continued without difficulty. The lifting process was carried on as rapidly as the concrete hardened sufficiently to bear its own weight, and as soon as the form was a foot or more above the level of the concrete, more of this material was poured.

Thus, pouring and lifting were going on almost continuously, but a point was made not entirely to fill the form, so as to permit a fresh bond to be made more easily. This process made it possible for work to be continued much more rapidly than under the old system, when each section had to be allowed to set completely before the forms were knocked off. Obviously, also, the method was extremely economical of material, and after the first sectional forms were rigged up, no further form material was required.

Caution in Raising Forms.

In using this system it was of course necessary to use good judgment, not to raise the form before the setting process had proceeded sufficiently to enable the concrete to stand by itself. After that, however, the raising was done so gradually that by the time the entire four feet of form depth had been poured, more than twelve hours had elapsed and the setting had been completed.

If the concrete stuck to the forms on account of frost; if the concrete was soft and had not set properly, or if for any other reason the form did not move freely, an uneven distribution of the force applied by the jacks would have resulted in broken concrete. Thus the work called for careful treatment, so that the progress of the form should be steady and equal at all points. In one or two instances small breaks occurred because of failure to observe this, but these were easily repaired and did not cause serious trouble.

The forms supported the scaffolding used in the work, so that they carried a considerable load. The objection was heard that this load was too severe for new concrete, and that an accident might happen under such conditions that would precipitate the whole crew to the ground. Owing to the heavy reinforcing, which would enable the structure to stand even if the bond of the concrete were broken, there was comparatively little chance of this happening, while as a matter of fact the gradual progress of the form gave the concrete opportunity in which to attain some strength.

On the other hand, if the concrete did not harden as it should, the fact was easily noted as soon as the form began to rise, and more time was allowed. The

main point to be cared for in this connection was to see that those in charge of the jacks worked together so as to prevent the concrete from being scored or broken by the pressure being unevenly distributed.

Work on all of the tanks progressed at the same time, although each structure was independent of the others. This meant that if the concrete set more rapidly on one than on another, it became necessary to allow it to remain for a considerable time while the other forms were being elevated to the same height. The gas pipes to which the forms were tied were graduated, so that it could be determined whether or not the forms were even all around. By this means no concrete was poured until each individual form was trued up, and it was found best not to pour until all of the forms were on the same level.

Most of this work was done in cold weather. It was begun in November and the finishing touches are being put on at present. As indicated, the material itself was warmed thoroughly before being used, 100 feet of pipe carrying steam through the sand and gravel, while a steam pipe line was also operated from a boiler which supplied heat for the concrete as it was being poured. The pipe was moved about inside the form and the steam allowed to flow into the concrete, and this treatment was repeated often enough to prevent any danger of freezing under ordinary temperature conditions.

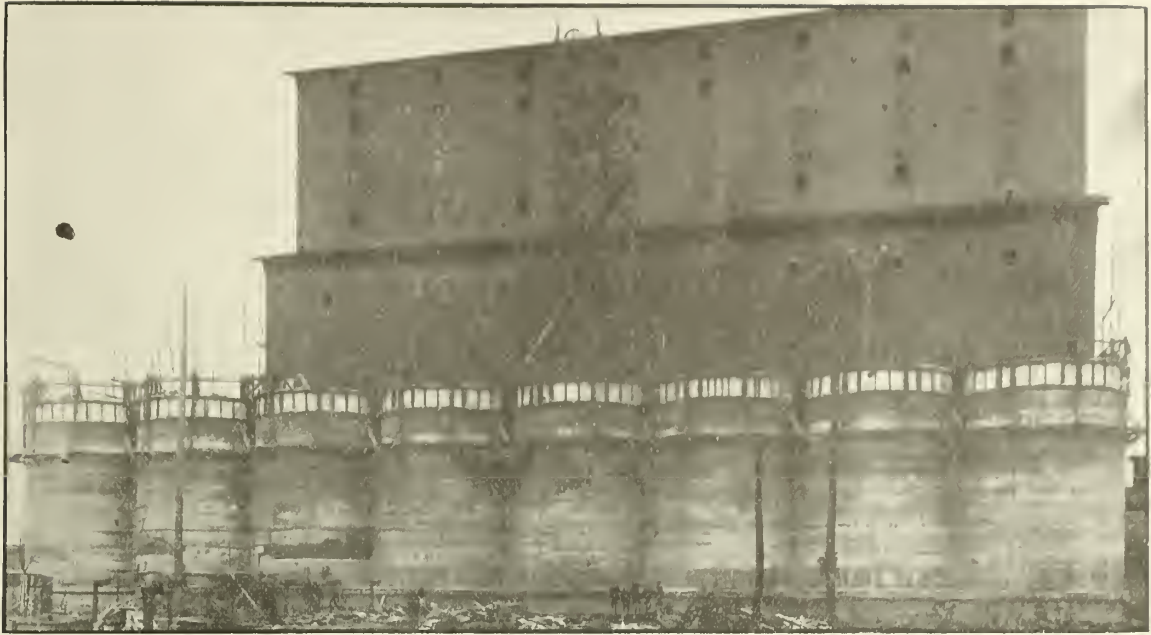
A good many days were lost on account of cold weather, when it was found that the concrete was freezing up and not setting properly. When that happened no work was done, as it was thought best not to take any chances with the material under such adverse conditions. Most of the work was done with the temperature between 40 and 60 degrees.

Forms Used Prove Advantage.

The use of metal forms on this job was an advantage, in spite of the fact that the cold penetrated them more easily and permitted the concrete to be chilled thoroughly on account of the comparatively thin walls. This emphasized the necessity of unusual precautions in handling the material, and these, as indicated, were taken through the use of boiling water to prevent frosting and steam run into the concrete after being poured.

Wooden forms would have provided greater protection for the concrete, but this advantage, it is thought, would have been more than offset by the fact that in moving, the gravel in the mixture would have scored the wood, and after it had been raised a few yards it would have been exceedingly difficult to secure smooth and even progress.

The use of the methods which have been described apparently does away with two of the most serious obstacles in the way of economical construction of reinforced concrete jobs: the necessity of the concrete workers being idle part of the time, waiting for the mixture to set, and the extravagant use of timbers in the manufacture of new forms. While it would be difficult or impossible to apply this



Concrete Elevator Bins Nearly Completed

method in the case of ordinary building construction, it worked admirably in a cylindrical structure with unbroken wall lines, and probably could be used to advantage in other ways.

Under fair conditions, in the job referred to, about four feet of wall a day was poured. Under favorable weather conditions, with the temperature high enough to make setting rapid, as much as eight feet were poured in a day. Night and day shifts were run by Supt. J. F. Letts, arc and incandescent lamps being used. This was in order to make up for the time lost because of cold weather.

It is expected that the equipment will be installed and the addition to the plant put in operation about April 1, after a total consumption of 3,100 yards of material.

CRACKED CONCRETE CHIMNEYS.

Sanford E. Thompson, in a report dealing with the cracked concrete stack of an English manufacturing plant, discusses conditions and some possible remedies which are of interest to those American manufacturers who are burdened with big stacks built on the unhappy principle of dry-mixed concrete. In this particular case of the London chimney, the structure had been put up on the dry-mix plan that was in vogue some years ago. The lower third of the stack was of greater diameter than the upper portion, and in the region of the offset, and above it, there were many long vertical cracks. The internal temperature of the stack was pretty evenly maintained throughout the year by the usual operation of the power plant, and there was some leakage through the cracks from the outside. The main concern of the owners, however, was as to the stability of the stack.

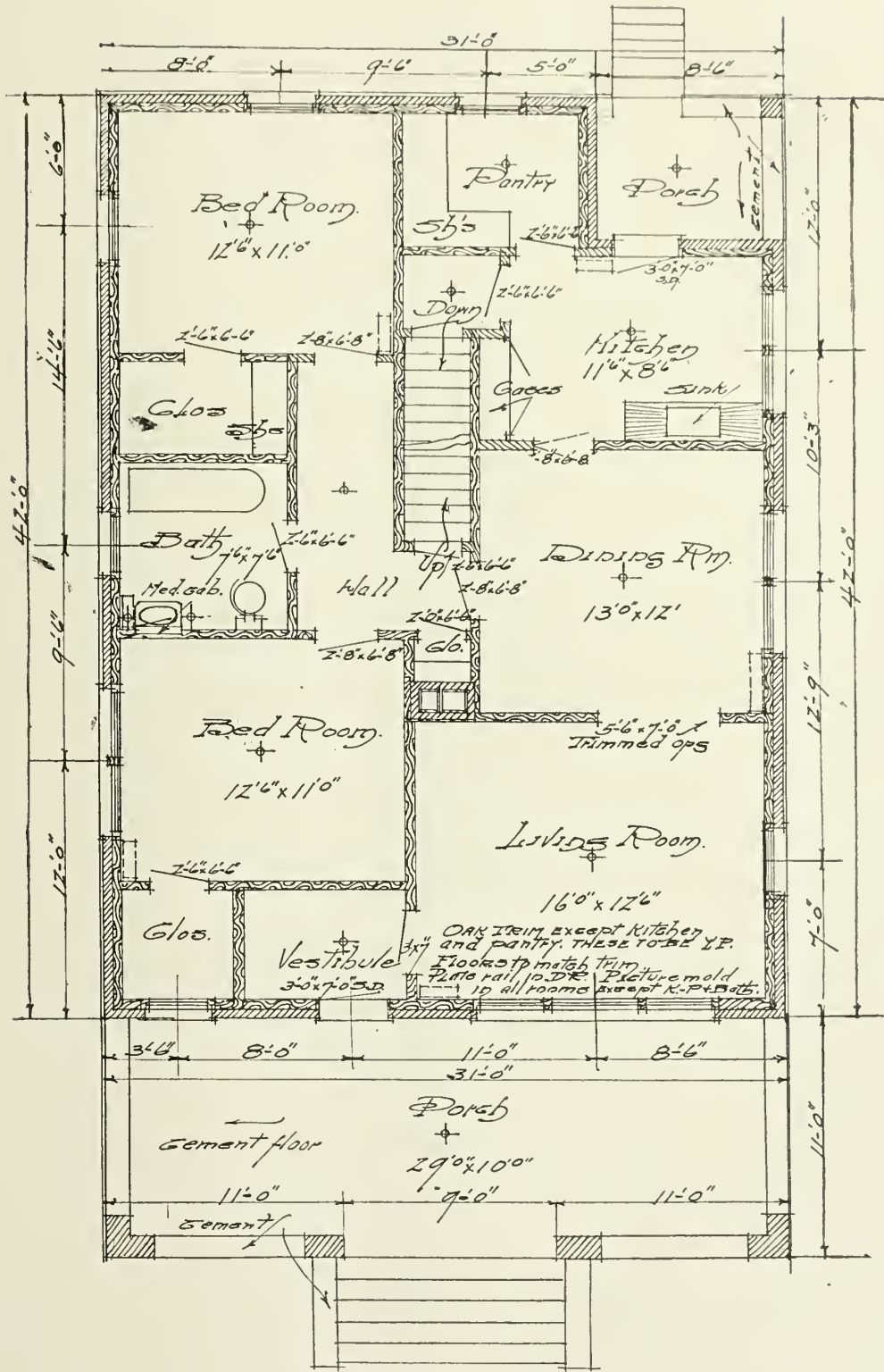
Danger from shearing stresses was considered very remote, since such stresses would not reach a critical point until long vertical cracks had formed on opposite sides of the chimney; and even then, an adequate amount of horizontal reinforcement would prevent

the disruption of the stack. Corrosion and consequent weakening of the reinforcing steel was considered the point of most danger, the probability of this being rather large in case of concrete mixed so dry that it did not make a perfect bond with the reinforcement. With wet-mixed concrete, says Mr. Thompson's report, the reinforcing steel is usually covered with a film of cement which will for a long time prevent corrosion of the steel by gases and moisture making their way in through the cracks.

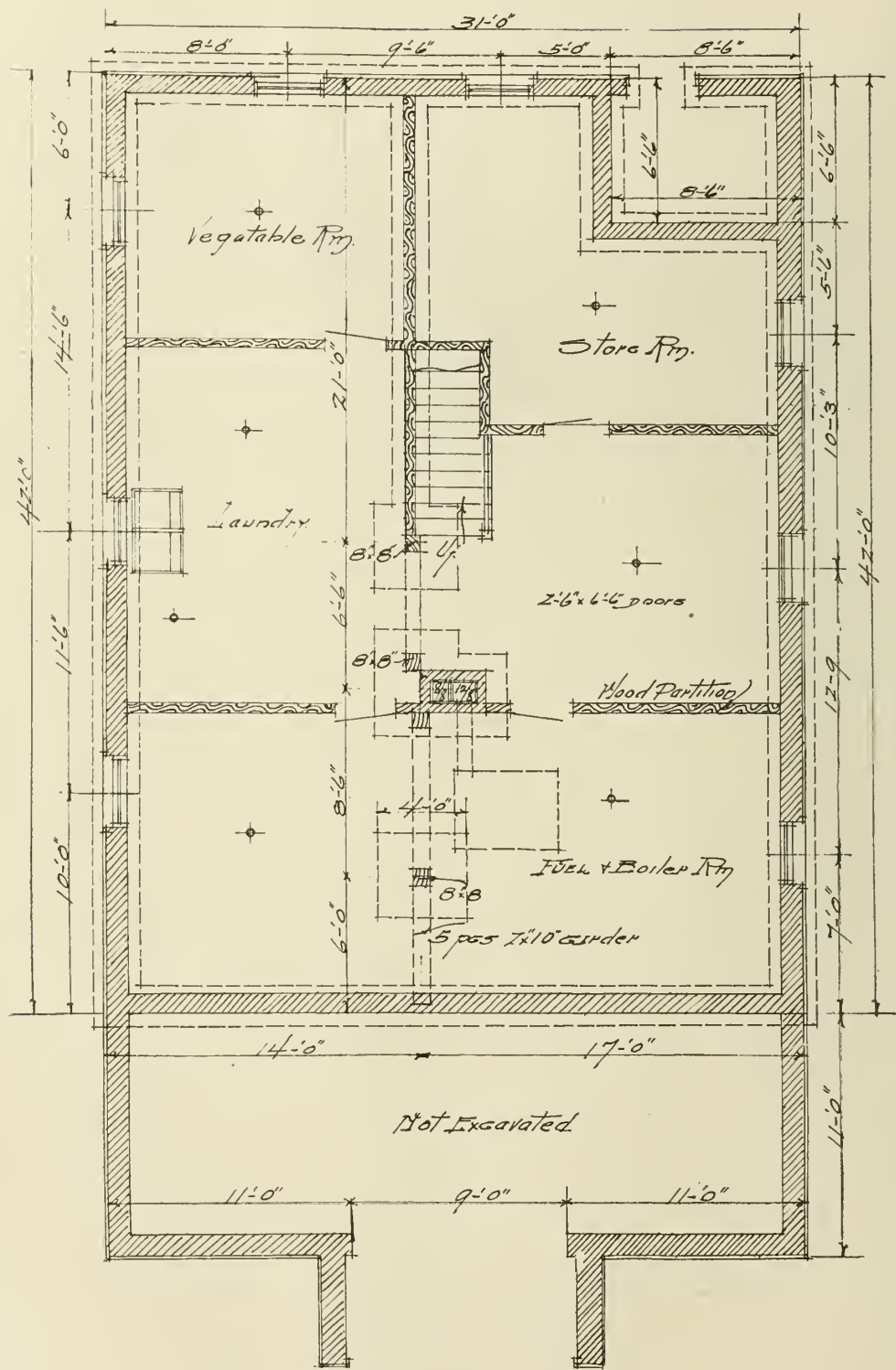
As to the remedies, the placing of a fire-brick lining was considered undesirable; such a lining would protect the concrete of the stack to some extent against the heat, but as good concrete easily resists a steady temperature of 600 to 700 degrees F., there was no need of a lining on this score. Moreover, it was considered that the presence of the lining might be mischievous through the new expansion strains which it might transmit to the concrete structure.

Repair by placing a shell of new concrete on the outside of the stack was considered by Mr. Thompson much the best course to follow. It is possible in building such a reinforcing shell to shut off all access of atmospheric gases and moisture to the reinforcing members of the original structure, and to use reinforcing steel in such a way as to make good the weaknesses that have developed in the original structure owing to cracks, or to a presumption of an insufficient bonding of the reinforcement due to too dry a mix.

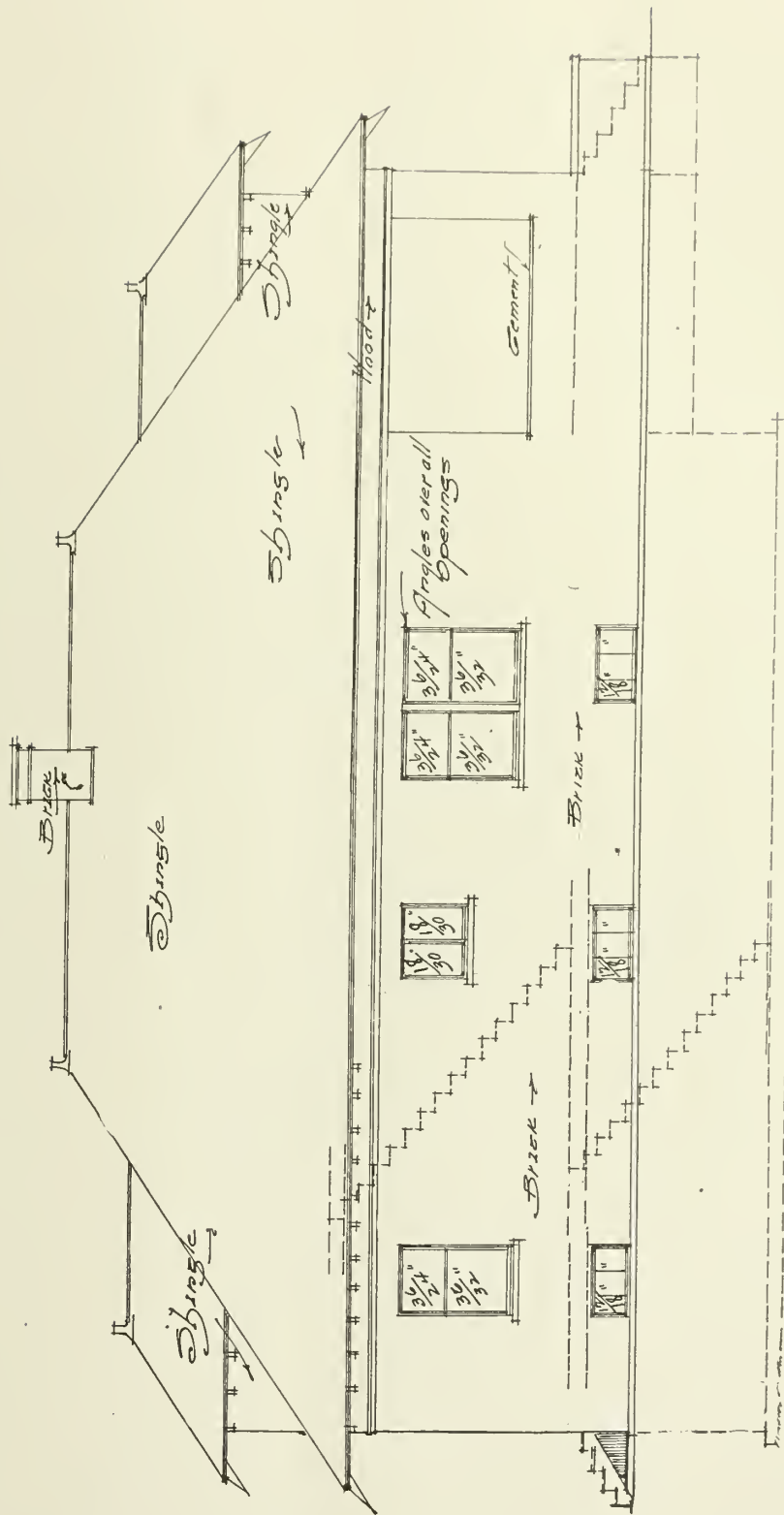
The American Syrian Chamber of Commerce has been organized, with headquarters at Beyrouth, Syria. The object of the organization is to further the interests of American manufacturers and exporters in that part of the world. Jos. B. Audi, Secretary, writes to CONCRETE that there is a demand for concrete machinery of various kinds and he suggests that literature be sent.



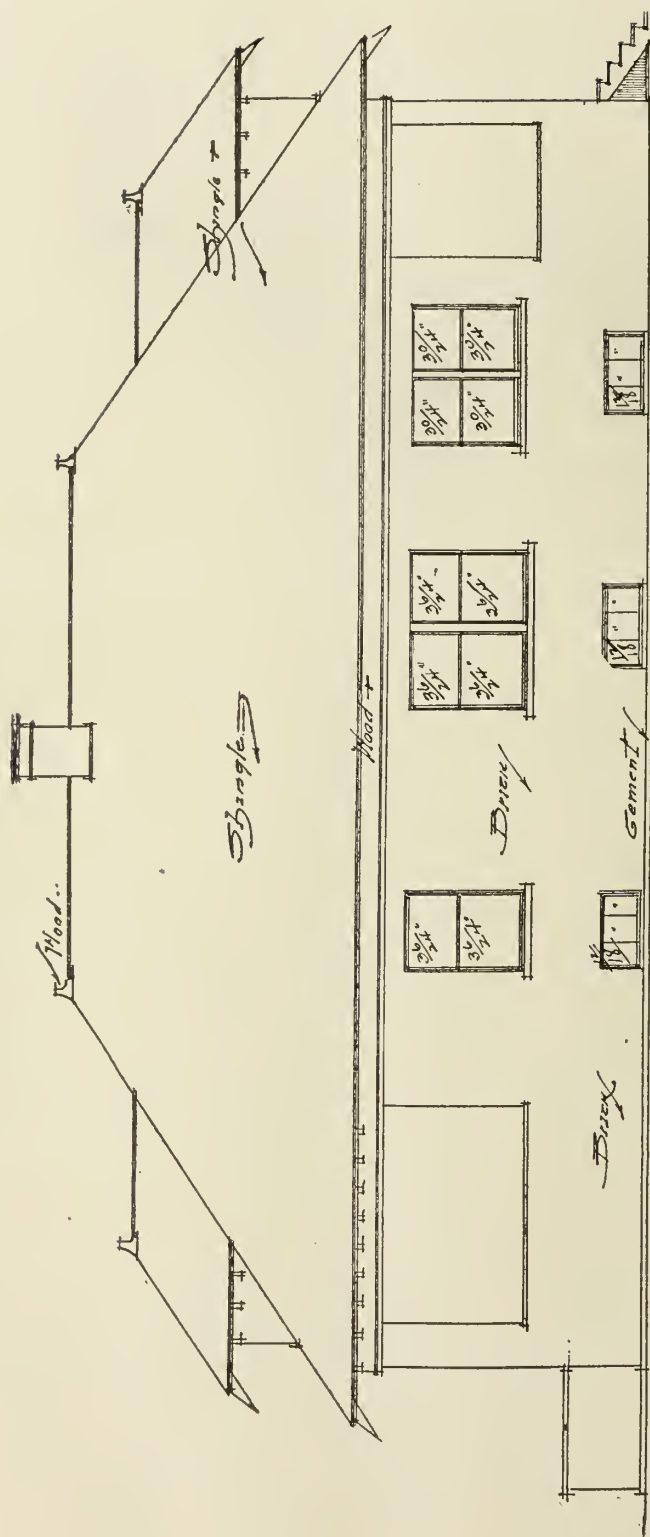
First Floor Plan—Scale $\frac{3}{8}"=1'$

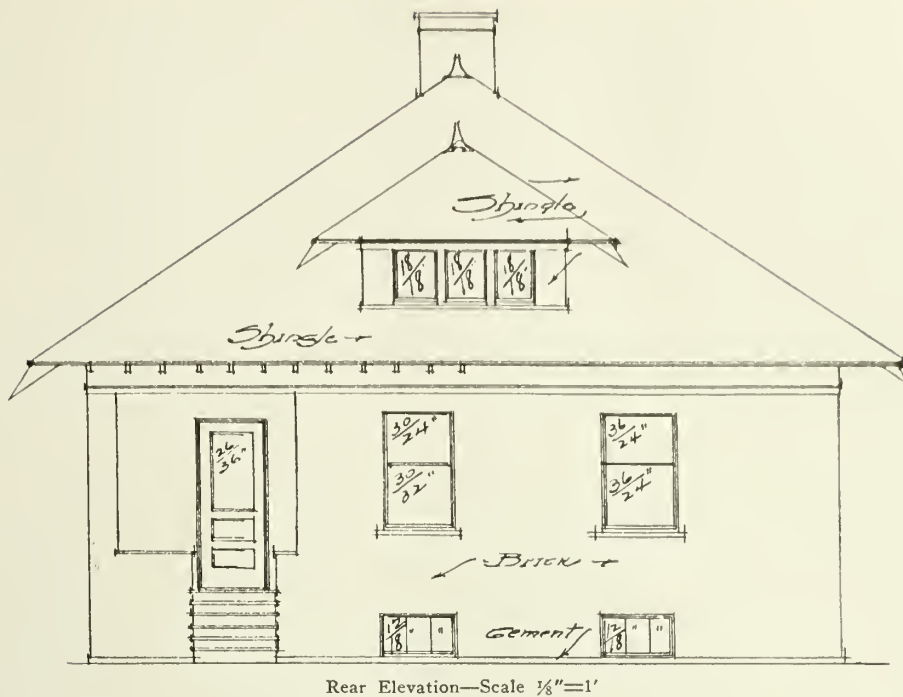


Basement Plan—Scale $\frac{1}{8}"=1'$



Side Elevation—Scale $\frac{1}{4}"=1'$





CONCRETE BRICK VENEER BUNGALOW.
(Continued from page 44)

in favor and more and more people are coming around to the idea of a cottage in which most of the rooms are on the ground floor. The prevalence of flat-dwelling may have brought about this result. Many people who find the flat arrangement somewhat to their liking but who do not like an upper flat because it takes them away from the ground and the garden, find the idea which suits them expressed in houses of the bungalow type.

Readers who use these plans to construct a home the coming spring and summer will be well pleased

There is to be a big power show in the Mechanics Building, Boston, Mass., April 22 to 27. At this show, which is under the auspices of the New England exhibitions of textile machinery, mill supplies, general textile products, concrete machinery and products. Communications should be addressed to the New England Association of Commercial Engineers, 12 Pearl St., Boston, Mass.

CEMENT GUN WITH NEWLY DEvised NOZZLE USED SATISFACTORILY BY GOVERNMENT.

Machines for putting concrete in place by compressed air, forcing the mixture through a hose, are coming into more general use, although when one of the machines was exhibited at the New York Cement Show in December, 1910, it was so new as to create an unusual amount of interest and to provoke very skeptical statements. One type of "cement gun"* has been used by the Quartermaster's Department, United States Army, in the Hawaiian Islands, and proved of value in the construction of the ordnance shop at Fort Ruger. The apparatus was originally provided with a nozzle that became worn and clogged

easily. These difficulties were overcome when Captain Edwards, quartermaster, invented a rubber-lined nozzle that gave complete satisfaction. The following description† of the device as used in Hawaii is furnished by Captain A. B. Putnam, Corps of Engineers:

The cement gun is manufactured by a New York company, and consists of an air compressor, a four-cylinder marine gasoline engine of 20 H. P., a 1" wire-wound rubber hose with walls $\frac{3}{8}$ " thick for delivering dry sand and cement mixed, an ordinary garden hose for delivering water to the nozzle of the gun, and the gun or nozzle itself.

The nozzles originally furnished with the machine were not rubber lined and soon became abraded, so as to render them worthless. The nozzle used by Captain Edwards, quartermaster, is lined with rubber (about $\frac{3}{16}$ "), so that no mortar sticks within. Furthermore, the rubber lining does not appear to become worn under use except very slowly.

A mixture (1:2½) of cement and fine sand is delivered to the nozzle at 30 pounds pressure, and just before being discharged is met by a circular spray of water at 30 pounds pressure within the nozzle, so that the wet mortar is projected on the surface to be covered. The water supply is regulated at the nozzle to obtain the correct consistency.

Triangular mesh is secured by staples to the studding of the structure, and is backed up either by heavy paper or wood placed so that the mesh will be in the center of a mass of stucco $1\frac{1}{4}$ " in thickness when the spraying is completed. In dwelling houses the stucco is placed on the studding inside as well as outside, but is made only about $\frac{3}{4}$ " thick inside. Smoothing is done by shooting a fine light spray of wet mortar. No finishing is done with the trowel. The finished surface inside is to be painted. The resulting stucco is very hard and makes a fair

*General Cement Products Co., New York City.

†From Daily Consular and Trade Reports.

appearance, though it is necessarily rough. So far, provided the mesh is placed so that edges overlap, I have observed no cracking. It should be noted that this stucco is merely a thin wall of plaster, and bears no strain except that due to its own weight.

When stucco is placed inside and outside, the paper backing (10 pounds per 100 square feet) is left in the wall. When only an outside coat is placed, the wood or paper backing is removed when the stucco has hardened.

One gun is placing 90 square yards, $1\frac{1}{4}$ " thick, per working day. The cost at present, including cost of studding and backing in place, is \$1.13 per square yard.

The hose now in use is stronger and heavier than the one supplied with the outfit, and the nozzle is different, being about 12" long, as against about 4" as supplied, and being rubber lined throughout, so that the mixture never touches the metal. There has been but little work done here as yet, so that cost data are not complete, and only since Captain Edwards applied a new nozzle has the gun worked well.

Tests are to be made by the Isthmian Canal Commission to determine the value of cement mortar, applied to iron plates by the "cement gun," as a preservative of iron at Panama. Twelve plates, 63.8" by 14" have been coated with a 1:3 mortar of cement and sand, after they were cleaned to gray metal by the sand-blast process. Six of these have been covered with a $\frac{1}{2}$ " coat, and the remaining six with a 1" coat on one side and $1\frac{1}{2}$ " coat on the other.

CHICAGO SHOWS UNPRECEDENTED GROWTH IN CEMENT TRADE.

Chicago cement producers and dealers are, with the advent of the new year, rejoicing over the fact that that city now ranks practically second in the United States as a cement marketing center. The year just ended has shown a gain of at least 25 per cent over 1910 and this increase gives Chicago next to the leadership, it is stated, in this rapidly growing industry.

Heretofore New York has been the principal marketing center for cement and kindred construction materials, owing to the tremendous production from the Lehigh plants and the seaboard trade, but the western metropolis, besides supplying the most of the western trade, has also made a big gain in eastern shipments and seaboard trade, thus bringing it up to a point where it is a formidable rival of New York. This position has been acquired the more rapidly and easily by reason of the recent opening of the new \$6,000,000 addition to the Universal Company's plant at Buffington, Ind., within the Chicago manufacturing zone. With this plant now equipped to produce from 20,000 to 25,000 barrels of cement a day and the plants at LaSalle, Ill., and South Chicago also in operation the record for 1912 is confidently expected to exceed that of any previous year.

Another reason for Chicago's commanding position as a cement manufacturing and marketing cen-

ter is the almost unprecedented growth in big business buildings, warehouses, dwellings and other buildings in the construction of which cement has played an unusually important part. An ordinance limiting the height of office buildings in the business district to 200 feet started a rush to begin building before the measure should take effect. The surprise came when the building boom continued past the time appointed for the ordinance to take effect, and Chicago is now witnessing one of the biggest building growths in its history. In practically every building cement is being used for the floors, pillars and walls, and brick, stone or terra cotta for the surfacing or veneer. The change to brick or stone veneer, however, does not seem to have diminished the demand for cement in any way.

"It is difficult to see how the cement business can lose ground for a long time to come," said a prominent Chicago dealer. "It has climbed into third place among American industries now, and under new methods of construction should continue to grow. Every big building now has the steel structure encased in concrete to prevent rust and oxidation, besides adding to the solidity of the structure, and 250 car loads of cement go into many single structures. Chicago should hold its position as a great cement marketing center and eventually may lead New York."

Dealers and producers point out that the coming of the presidential year will have little effect on the industry or others connected with building operations. If there is a depression, it is delayed, with a ten month's period between the first sign of business depression and the time it strikes the building industry, owing to the long term which generally prevails between financing and construction.

Increasing demand for fireproof building construction has also developed the sand and gravel business. These companies have done a heavy business during the past twelve months and are looking forward to a still larger volume of business for 1912. More than \$21,000,000 worth of sand and gravel was dug for sale in the United States in 1910 and there is no sign that the figure was any the less for the following year, nor that it will be smaller for the year to come.

From the point of view of Chicago manufacturers and dealers the new year promises a greater volume of business in building construction than any previous twelve months. These manufacturers and dealers, besides many other western operators in the same lines, are preparing for an active campaign among the eastern states and as far as the Atlantic seaboard, which has already yielded profitable returns for those who have ventured that far east. The outlook for the year has increased the interest in the coming Cement Show to be held in Chicago and it is promised that the success of that event, from the standpoint of exhibits as well as patronage, is now assured.

CONVEYING STONE AND SAND TO AND FROM CARS, PILES AND HOPPERS.

Facility in handling materials is a very important item not only in construction proper but in storing and conveying materials which later are to be used in construction. The illustrations show the use of buckets in handling sand and rock. Figure 1 shows a cement bag storehouse, receiving cars, general arrangement for unloading and transferring sand and broken stone as well as the delivery of mixed concrete from the mixer to turn-over cars. This picture was taken at the plant of J. F. Shanley & Co., Newark, N. J., and the work shown is a part of the concrete construction job on the new viaduct being erected for the Hudson & Manhattan Co. on its high speed line between New York City and Newark, by way of the Hudson tubes. On this job a one-cubic yard clam shell bucket with ore bowls (Hayward class E)* was used to unload the cars of crushed stone. An extra long boom was employed so that it was possible to reach over and escape the turn-over cars and allow the bucket to get its load from the freight cars on the extreme left. By this means the hopper was kept filled at all times and the freight track was kept clear by the rapid unloading which was possible. In addition to unloading the cars of crushed stone, this same bucket was used in unloading sand and transferring it to the hoppers. The hoppers are constructed side by side so the same bucket was used for both the materials which were being handled.

Figure 2 shows the use of a one-and-one-half cubic yard clam shell bucket of the same type described above and in this case the operating device was a stiff legged derrick and a two-drum electric hoisting engine. The derrick was equipped with a bull wheel to swing the boom and a Hayward counterweight drum. This plant is owned by the Bush Terminal Co., New York, and handles all the sand, gravel and broken stone used in the erection of the string

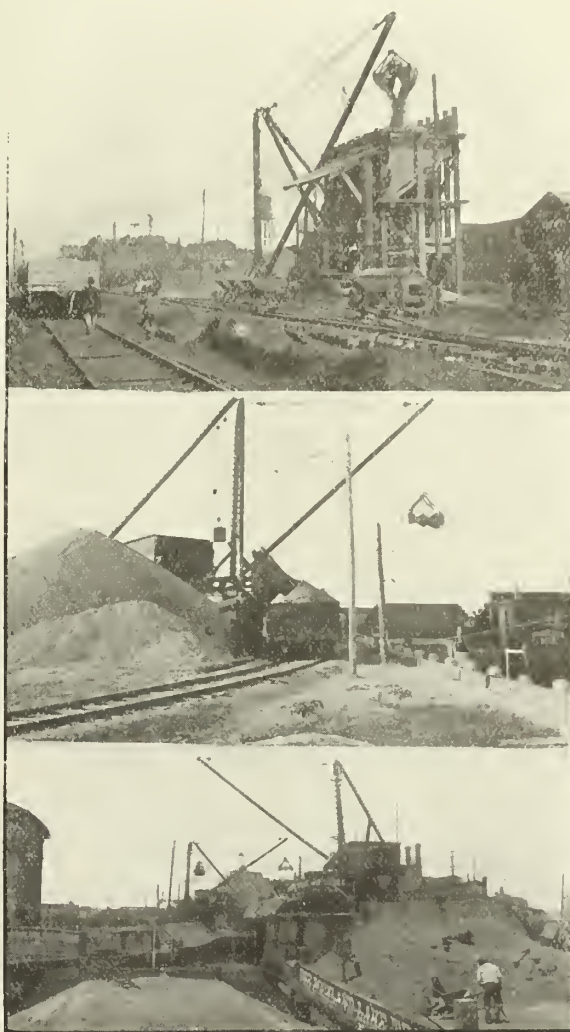
of huge manufacturing and storage buildings on the Brooklyn waterfront of New York harbor.

This equipment digs 1,000 cubic yards of sand and gravel per 9-hour day and transfers it from scows to railroad cars and from scows to storage piles. The bucket makes a round trip in 35 seconds. Quick unloading is very important under such circumstances, as it prevents large demurrage, which averages about \$6 a day. In this equipment drum No. 1 pulls a line which raises and lowers the boom. Drum No. 2 pulls a line which makes the bucket dig, and the counterweight drum keeps the slack down in the rope which is fastened to the top of the bucket and which holds

the bucket firmly when it is discharging its load. A swinging gear turns the boom and mast through three-fourths of a circle.

The Hayward Co. makes the statement that in the concrete field for handling broken stone, gravel and sand, two methods are employed: Either the hand-filled tubs are used or automatic buckets, and that the hand filled tub will hoist at the rate, including manual labor of hand shoveling, of about 30 tons an hour. The men who do the work are paid on the average of 10c a ton. Money is divided among the men in the gang when the job is completed. They say that an ordinary equipment with hand-filled-tub-plant calls for a crew of seven men and an engineer to operate the engine, a fireman, four shovelers and a tag lineman. They also say that with the automatic bucket a crew of three men is required and from 75 to 100 tons an hour can be handled.

Figure 3 shows the plant of the Hudson & Manhattan Co., in connection with the tunnel work in Jersey City. On this job, two buckets were used, one with $\frac{3}{4}$ cubic yard capacity and another with $1\frac{1}{2}$ cubic yards capacity. They have been in service three years handling crushed stone and sand. In this case, buckets were operated on a stiff legged derrick by means of electric hoisting engines and were used to feed two hoppers which are shown in the illustration. From the hoppers the stone and sand were taken to cable cars beneath.



Figs. 1, 2 and 3—Top Downward

*The Hayward Co., 50 Church Street, New York City.

PLAN AND EQUIPMENT OF CONCRETE BRICK MANUFACTURING PLANT.

BY H. H. BURNS.*

The brick business is one of the leading industries of the United States and scarcity of lumber and the growing demand of people in cities to escape the dangers consequent upon the use of such highly combustible material as wood have a tendency to increase the proportions of the brick industry.

Cement product manufacturers are placing concrete brick on the market, and each year has shown a remarkable gain. Concrete brick are now recognized by many builders and architects for their true value—the most substantial brick.

Durability always has been, and always will be the chief aim of the engineer, architect and contractor regardless of nature or size of the building. Concrete

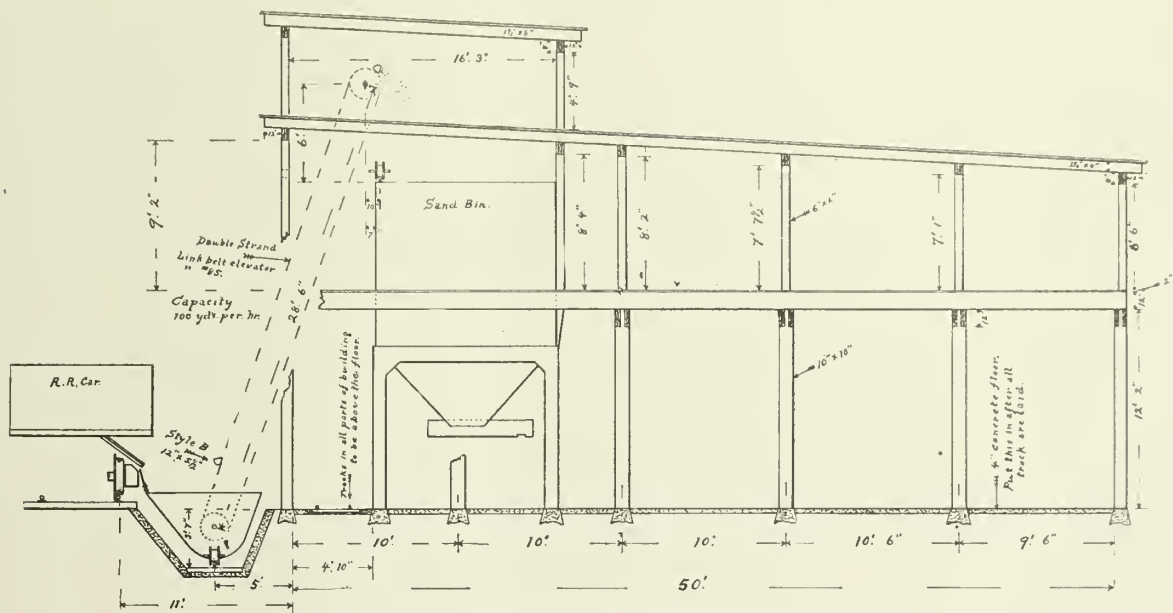
that the price in itself will constitute an advantage over other competing materials.

Much depends, of course, upon the machine and much depends upon the arrangement of the plant in which the machine is operated. It is necessary to reduce labor cost and to turn out a product in large quantities to sell at a low price and yet be sure that the product is a good product so that it will stand up under test.

Concrete brick will continue to increase in use even at a considerably higher price than that of clay brick. It has advantages, as has been said, which other brick materials do not possess.

Economical Production.

The Besser Manufacturing Co., Alpena, Mich., not only makes the machinery but also operates a plant



Section View Showing Sand Elevator

brick have solved the problem of endurance. They require no burning, so do not warp out of shape after being molded, and every brick is absolutely uniform in size, in strength and in color.

The elements that disintegrate and destroy other brick are a distinct benefit to concrete brick and only tend to make them stronger and harder. They can be made in almost any color; the absorption is less than in clay brick, and they will not show discoloration. The demand from builders for a product that will stand the ravages of time and retain its attractiveness has caused the sale of concrete brick to increase rapidly.

The Colcord building, in Oklahoma City, 16 stories high, is built of reinforced concrete and concrete brick, and is considered the most beautiful and up-to-date building in that progressive city.

In the manufacture of brick of the more durable material, concrete, the necessity in order to command a ready market is not merely to show a product of superior value but to be able to sell it at such a price

for the manufacture of concrete brick and other concrete products.

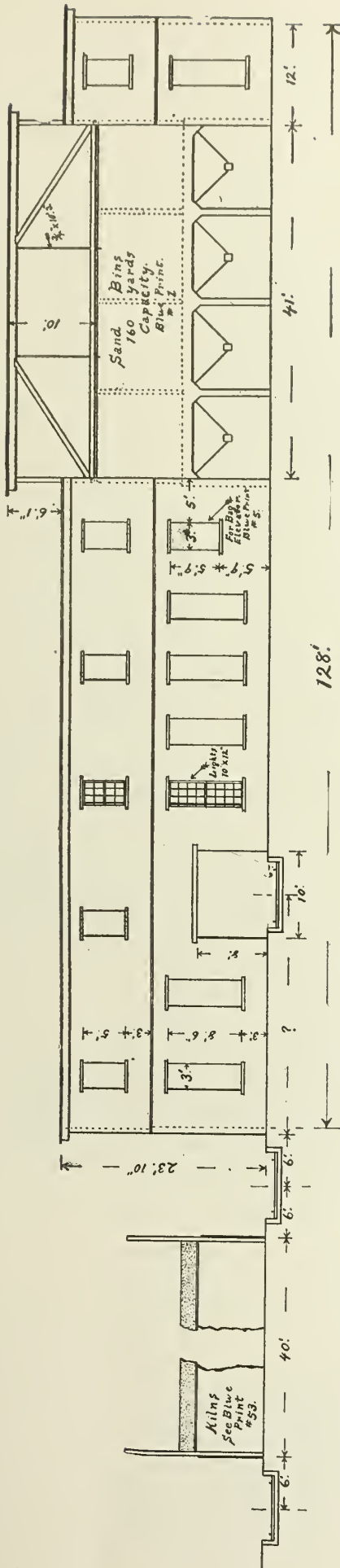
This plant was designed by the writer. In it neither the material nor the finished brick are handled from the time the material enters the mixer until the cured brick are taken from the curing cars and piled in the storage yards.

The brick machine is automatic, with a capacity of from 30,000 to 60,000 brick per ten-hour day. It is a tamping machine and simple in operation.

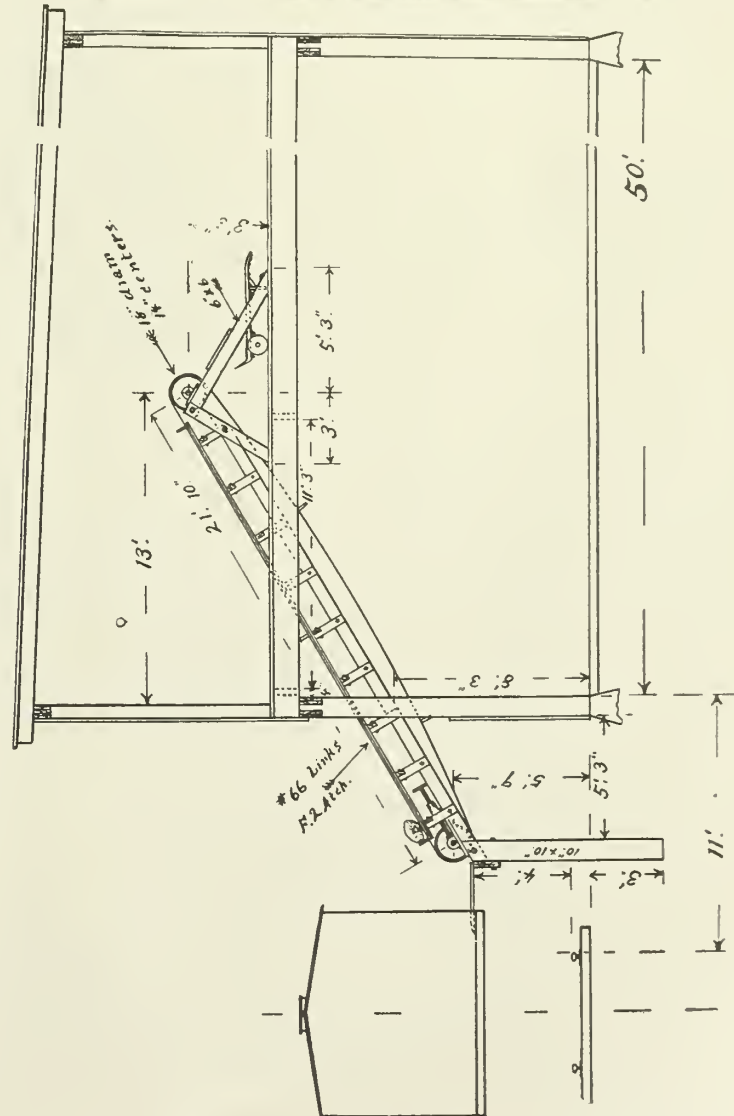
The brick molds are arranged in an endless chain, which travels slowly around beneath the hopper. The hopper also carries the dividing plates, which pass between vertical slots in the molds. The material is fed in at the back of the hopper by an elevator leading from the mixer. As the molds on the endless chain pass beneath the hopper, and alongside the dividing plates, the material settles down into them and upon the pallet of each mold. The molds keep right on, never stopping, and next come to the tampers. There is always an excess of material in each mold, so that there is no chance for porous or defective brick. The tampers are eight in number, being

(Continued on page 56)

*Mechanical Engineer, Besser Manufacturing Co.



Above is shown Front Elevation of Brick
Plant and at the left Plan of
Elevator for Bags
of Cement.



one for each brick. They work up and down at a speed of 100 blows per minute, and ram the concrete in the molds to a wonderful degree of hardness and density.

The brick are made on the flat, which gives a two face brick, also leaving on the flat side of the brick a certain roughness so that the mortar readily adheres, thus preventing the slipping or floating of the brick when being laid in the wall. Being made on the flat also allows the use of wet material, which means everything in the manufacture of good brick. The use of enough water gives a hard, flinty product.

At the moment that the brick are released, the arms of a simple chain carrier gently pick up the pallet full of brick, carry them away and set them down on the car. This carrier automatically piles the self-racking pallets, each with its load of eight brick, upon the curing cars. Each car holds about 1,000 brick, and it is merely necessary to shove the loaded cars off into the curing kilns.

The plant is a two story structure, 50' x 128'. The upper floor is for the storage of cement, which is elevated from the car door by means of a bag elevator, as shown in the plans. The bags fall from the elevator to a hand truck. With two trucks, three men in the car can be kept busy placing the bags on the elevator, thus requiring only a short time to unload a car of cement.

Mixer for Each Machine.

The floor plan is so arranged that the following machinery may be installed: Besser power cement brick machine, cement drain tile machine, which makes from 4" to 16" diameter in 12", 18" or 24" lengths; large power tamp machine, that makes drain tile or straight end tile, socket joint, and bell-end-sewer tile, 8" to 48" diameter in 24" or 30" lengths; automatic power concrete block tamper, having a capacity of 600 block per day, and an automatic concrete fence post machine that will turn out 1,000 posts per day. Each of these machines is equipped with its own mixer, which makes each different product machine an independent unit, thus making it possible to operate the entire equipment at one time. There is also a space of 400 sq. ft. for ornamental concrete work.

Each mixer is provided with a cement supply hopper, which has an automatic feed that is timed so as to keep the cement at one height in the hopper on the mixer. It is a well known fact, with any make of a mixer, that if the material is kept at a certain height in the hopper the sand and the cement will feed into the mixer in more nearly accurate proportions.

The cement supply bins connect with the floor above and have a capacity of 6 or 8 barrels each. This is a great labor saver, as one man can attend to keeping all of the bins full, or when only one or two machines are run, this man will have time to attend to other duties.

The sand is elevated from railroad cars (and it might be arranged to take it direct from a bank) into storage sand bins. Details of these bins are shown.

Each bin has a capacity of 40 yards, or one carload. The bins may be built of reinforced concrete or of wood. There is arranged at the bottom of each bin a helicoid 9" conveyor, which delivers the sand or crushed rock to a conveyor belt, in any amount or proportion as required.

With this arrangement sand and crushed rock may be mixed together in any proportion that may be necessary. By timing the conveyor worms, which is done by changing the sprocket wheels, the sand is distributed equally upon the crusher rock as the belt passes along under the conveyor. The conveyor belts are so arranged that the sand or mixture is delivered to the mixers automatically. Therefore, the sand or crushed rock, after being delivered to the bins, requires no more labor until the finished product is ready to be placed in the yard.

The car tracks are so arranged that there can be no blockade in operating the different machines, thus affording direct communication to the kilns.

The kilns are constructed with concrete walls and roof; the roof is of arch form, which prevents the condensed vapor from dripping on to the green product. The tunnels have single tracks, with a concrete water trough extending the entire length, in which the steam pipes are laid. By this method the danger of getting the kilns too hot is prevented.

The design and construction of this plant eliminates all possible labor and enables the manufacturer to meet the prices of competitive products.



House of V. I. Stevens, Akron, Ohio. F. W. Bielman, architect; stucco on hollow tile.

The Middle West Cement Exposition and the Nebraska Cement Users Convention will be held in Omaha, Neb., February 6 to 9. Headquarters will be at the Rome Hotel, where the meetings of the Association will be held, and the show will be held in the Auditorium, only one block from the hotel. Peter Palmer is Secretary and Treasurer of the Nebraska Cement Users' Association. There is every indication that this is to be one of the live meetings of the people of the cement industry of the Middle West to be held this winter.



Pavilion of cast concrete on bank of artificial lake, estate of Lewman Erd, Elberon, New Jersey. Clarence Luce, architect; J. C. Kraus, contractor.

Residence of E. T. Bedford, Green's Farms, Connecticut, of stucco on hollow tile. Montrose W. Morris, architect; John C. Udall, contractor, and A. W. Miller, plaster contractor. Balustrade and railing are of concrete. White Portland cement was used in all the work illustrated on this page.



CONSTRUCTION OF REINFORCED CONCRETE TANK TO HOLD BEER MASH.

BY OLIVER RANDOLPH PARRY.

Concrete in tank construction is by no means new but its employment, when submerged in water and subjected to the strict regulations of the United States government regarding absolutely water-tight qualifications from within and without—such work will be found of interest to engineers and an example to the public of the possibilities of concrete in water resisting construction.

The example herein cited is the larger of two tanks constructed in the spring of 1911 for The Farm Products Manufacturing Co. in its Quakertown, Pa., plant, by the Linker-Losse Co., Philadelphia, Pa., from plans and specifications of the writer and erected under his supervision. The tank is 11' x 14' with a clear head room of 5' and was designed to hold not less than 3,500 gallons of beer mash, the company manufacturing de-natured alcohol.

In erecting the building proper, the year previous it was found that the entire ground surrounding the building was wet and marshy, the soil being impregnated with springs and with crevices in the soft red shale wherever the excavations reached this rock.

The work of building the tank was started in March, 1911, in the period of thaws and freshets. It took three men two days to make the forms; three men three days to place the steel of the interior cage. The tank was erected on a three inch slab placed on a thicker layer of crushed stone resting on a foundation of creviced red shale rock. Owing to the water it was necessary to construct a drain of 3" agricultural pipe laid to discharge at a central point at the corner of the tank near the wall as shown. After pumping the excavations dry, the pumping was maintained systematically at intervals of fifteen minutes during both day and night in order to keep the water below the line of the bottom slab. In pumping, each operation discharged fifty gallons of clear water which was retained in barrels and used for this and the other concrete work. The work of reinforcing

the 3" slab was accomplished by the use of $\frac{1}{4}$ " rods 4" on centers each way held together by wire clamps. This reinforcing, both ways, was turned up about 3' 6" to supply vertical reinforcing for the retaining walls, to restrain the earth under the foundations of the building and to take the concentrated load on the adjacent piers which carried one-half the floor and roof loads of the building. In addition longitudinal reinforcement was incorporated 12" on centers

Retaining Walls Eight Inches Thick.

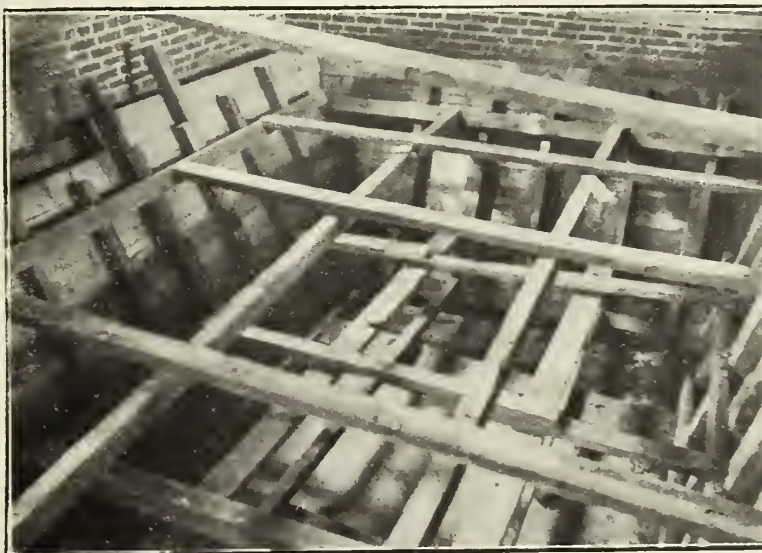
The retaining walls were 8" thick from the slab to a point 2" above the top of the footings, water leaking through the sides of the whole masonry footings in continuous fine streams. The drain before mentioned was found most beneficial in preventing oozing of the water through the bottom slab but did not take care of the water from above. In consequence, the water broke through the seam between the slab and the vertical retaining wall. Resort was therefore had to single ply roofing (tar) felt at the sides and over the slab laid to overlap in two thicknesses and sandwiched between with hot pitch, particular care being taken at all the jointings. Over the slab was placed 2" of rich concrete which served to anchor the tarred paper and to allow the formation of a temporary drain

around the edges with an outlet at the low point of the slab through which a 1" hole was punched connecting with the drainage system. By this method no pressure was exerted against the tarred waterproofing.

Upon completion of the preliminary work the actual construction of the vat proper was begun with the construction of the interior forms set on an angle to form beveled sides to the tank with the wall 12" thick at the base and 6"

at the top. A cage of reinforcing steel was fabricated of $\frac{3}{8}$ " rods laid 4" on centers over the short way of the base with the ends turned up to project about 3' 6" above the base.

Over the long direction of the base $\frac{1}{4}$ " rods were employed, placed 6" on centers and turned up on the edge to reach the top of the tank. The horizontal rods were then placed around the four sides about 12" on centers, bound to the ends of the rods previously



Tank Complete. Form Work.

placed on the bottom or slab. All the rods were fastened together by special clips made by the Philadelphia Steel & Wire Co.

The forms were then placed, the four corners each resting on two bricks, in such a way that the base of the forms was 5" above the concrete previously laid upon the tarred paper. This was done so the sides and base could be poured as an absolute monolith.

The forms were filled in 4" layers around all sides; one man being employed continuously to do nothing but attend to the spading which was accomplished with a straight-handled, 6" x 12" blade, iron spader.

Six men were employed in pouring and mixing on the platform adjacent to the tank, troughs of "V" shape being employed to chute the concrete to the various points desired throughout the work.

Spading and Tamping Difficult.

It was impossible at certain points, on account of the perpendicular walls of the building and sloping sides of the tank, to spade as thoroughly as desired and as a result when the forms were removed it was discovered the concrete in places was not absolutely compact and it developed that water filtered through these places. This was remedied however by plastering the interior of the tank by an unique use of highly heated bricks which were laid on these spots for about an hour. In a number of cases it was necessary to continue this operation longer in order to secure the best results.

The theory underlying this treatment was that the pressure exerted through any pin hole is not great and that by applying the mortar with the superimposed hot bricks, the weight of the latter resisted the pressure of the water, while the intense heat of the bricks caused the cement to set quickly so that upon removal of the bricks the cement had acquired sufficient strength to withstand the pressure of the water from without.

The mixture employed for the base of the vat and for the sides to a point 3' above the base was of one part cement, two parts sand and two parts $\frac{3}{4}$ " trap rock. The upper section of the tank were made of one part cement, two parts sand and four parts $\frac{3}{4}$ " trap rock.

The lower part of the vat, it will be noted, was of the above proportions in aggregate result but as a matter of fact the mixture of quarry run stone was to give the densest concrete. There were five sizes running from dust to $\frac{3}{4}$ " trap rock (dust, $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ "). All of the stone was hard trap rock obtained from the General Crushed Stone Co.'s plant at Rock Hill, Pa., a few miles from the operations. The concrete lining was made of one part cement and rock screenings passing a $\frac{1}{8}$ " seive, and was about $\frac{1}{2}$ " thick.

It took four men ten days to build the tank; intervals elapsing between various stages so that thirty days were required from the beginning to the completion of the work. These intervals were as follows: three days for bottom slab to harden, three days before the vertical forms of retaining walls would be removed,

four days for the concrete laid upon the tarred paper at the base of the tank to harden and ten days before the safe removal of the forms from the vat—this owing to the existing pressure of 190 pounds of water to the square foot constantly encountered throughout the operation.

As to the cost: the cement was bought for \$1.75 per barrel, sand for \$1.50 per ton, and stone for \$1.15 per ton; all delivered at the building. The labor cost was as follows: for foreman, \$4.50 per day; skilled artisans, from \$2.50 to \$3.50 per day, and unskilled labor \$2.00 per day. The contract figure for the tank was \$297.50, but it must be borne in mind that this work was executed in connection with much other work including machinery, foundations, other vats and concrete floors. Alpha portland cement was used except at the beginning where another brand was tried which failed to set up quickly. The cement was received in paper bags which was found to eliminate all annoyance of handling and in counting and storing cloth bags as would otherwise have been the case. As an experiment one bag of Union natural cement, which is a quicker cement than American Portland, was tried, but its use was not continued.

Below Creek Level—No Leaks.

The forms were made of $\frac{7}{8}$ " hemlock boards, surfaced both sides; 2" x 4" studs spaced 20" on centers and 2" x 6" ledger pieces spaced about 3' apart horizontally on the 2" x 4" pieces. The cross braces (three layers) were 3" x 6" and proved very satisfactory as no trouble was encountered in any bracing.

Over the greater part of the vault was a reinforced concrete slab designed to sustain a safe live load of 200 pounds per square foot. This slab, including the 1" top coat is $6\frac{1}{2}$ " thick, the steel reinforcing consisting of $\frac{3}{8}$ " rods spaced, in both directions, $3\frac{1}{2}$ " on centers. This slab is supported on the open side of the tank by a 10" x 17" reinforced concrete beam, the steel reinforcing being four $\frac{5}{8}$ " rods at the base, two running straight through and the other two being bent up at the third point to form a truss; in addition to this two $\frac{3}{8}$ " rods were placed at the top to provide for expansion and provide support for the $\frac{3}{8}$ " slab rods turned up at this point.

The top of this beam, together with the coping around the vat, supported a wooden cover enclosing the opening of the tank, this being 12" above the finished floor of the building proper to prevent ingress of any foreign material.

It is interesting to note that no leaks are apparent anywhere in this tank, notwithstanding its having been built adjacent to a creek and actually 12" below the bottom of its bed, and that in the construction of the work several spring freshets occurred causing the water to rise to a point less than one foot below the top of the tank. Quakertown, that is, the business section, is situated about one-quarter of a mile distant with an upgrade from the point of the work, and for several years great trouble has been experienced by the merchants in waterproofing the basements of their shops, it having been stated that they have met

with complete failure. The work at the Farm Products Manufacturing Co.'s plant was started in the face of predictions that to attempt to build a sunken beer vault of concrete at this point would be a monumental folly.

CONCRETE BUILDINGS IN CHICAGO

(Continued from page 28)

them are actual demonstrations of the rapidity of concrete construction in freezing weather.

The following dates, which represent the time of pouring for each floor of the new Sharpless Cream Separator Co. building, are considered unusually significant in connection with the erection of a ten-story office building, showing, as they do, that this sort of structure may safely grow up into the air at the rate of a floor a week:

First floor, Sept. 21-22; second floor, Oct. 6-7; third floor, Oct. 13-14; fourth floor, Oct. 23-24; fifth floor, Oct. 31-Nov. 1; sixth floor, Nov. 15-17; seventh floor, Nov. 24-25; eighth floor, Dec. 4-6; ninth floor, Dec. 14-15; tenth floor, Dec. 21-22.

Steam and hot water were employed when the weather required their use to prevent freezing and no bad effects were observed in the method used. A similar course was pursued in the construction of the building now under construction for the use of Rand, McNally & Co., publishers.

One feature of the Sharples building has been the use of steel columns encased in concrete for fireproofing from the first to the seventh floors. Above the seventh floor reinforced concrete columns were used. This method of construction was followed because of the saving in floor space which it effected in this case. In other Chicago buildings concrete with substantial reinforcing has been used throughout for the columns.

The reinforced concrete design of the Sharples building, photographs of which are shown herewith, was made by Theodore L. Condron as consulting engineer for the architect, W. D. Mann. The building is 74' x 90' in ground area, and has ten stories above the basement. It is probably typical of the concrete construction in office buildings now in progress in Chicago. The foundations are concrete caissons carried to hard pan, 75' below the street level. The floors and columns were designed for the full dead load coming upon them and for a live load of 225 pounds per square foot. The column spacing is 18' x 17' 5", and the story heights are generally 11' 9" from floor to floor, while the first story is 14' 9" and the second story 12' 9".

The Reinforcing Used.

The floors are of flat-slab reinforced concrete 8" thick and the columns are of uniform size from basement to the tenth story, being 2' in diameter with capitals flaring at the top to a diameter of 4', above which is a plate 4' 6" square. All of the loads on the lower columns are carried by the structural steel. By the use of structural steel in the columns it has been possible to keep their size much smaller in the lower

stories than would have been possible had hooped columns been used, thus saving a considerable amount of floor space where the rent value is highest and also greatly improving the lighting of these floors.

The reinforced concrete floors are of the Condron & Sinks type of construction, in which the reinforcing bars are placed in two directions only; that is, to say, parallel with the lines joining the centers of the columns longitudinally and laterally. No diagonal reinforcement is used in these floors, consequently there are two layers of bars only over the column heads.

The floors were tested under the requirements of the Chicago building code with a test load of 550 pounds per square foot covering two entire panels. This load is equal to twice the live load plus the dead load. After the test had continued on the floors for two days the maximum of deflection at the center points for each of the two panels was 0.2" and 0.22" respectively. The permissible deflection in these spans under the city code, namely 1/800th of the span, the diagonal span being 25", is 0.38".

Specifications for the reinforced concrete call for one part cement, two parts sand and four parts broken stone or gravel, with the further requirement that the proportion of cement used to the total aggregate shall be in the above ratio, but the relative proportion of the fine aggregate to the coarse aggregate shall always be such as to give a maximum density, and this proportion shall be so adjusted as to secure the required result.

The concrete was mixed quite wet and deposited by means of an inclined pipe or chute. In the milder weather the finish, or wearing surface, was put on before the concrete in the floors had taken its initial set and therefore the thickness of the wearing surface (.75") was included in the total thickness of the floors. After the cold weather set in the finish coat was omitted and the floors were made 8" in thickness and will be 8.75" thick when entirely completed. The finished floors will be ground down with carborundum by the contractors, Bully & Andrews. The exterior walls of the building will be veneered with semi-glazed terracotta and red brick.

In the construction of the Rand, McNally building, which is larger than the Sharples building, measuring 299' x 216' ground area, the contractors, Wells Brothers, have followed a similar course in the flat-slab construction of the floors. These floors have a thickness of 10.5" with no panel. Square twisted reinforcing laid longitudinally and laterally has been used. The columns have been fireproofed with concrete and the span between pillars measures 16'. About 33,000 cubic yards of concrete are going into this ten-story structure, which will be one of the largest concrete office buildings outside the Chicago "loop" district.

Cement Gun to Lay Floors.

A new method of finishing the floors of this building is to be used. A cement gun which is now being prepared to shoot 20,000 feet of cement a day is to be employed by the contractors. The present capacity of this device is in the neighborhood of 6,000 or 7,000 feet per day.

During the severe winter weather work was continued in concreting with the aid of hot water, steam

and 330 salamanders and satisfactory results were obtained by the contractors. The floor test in this building will be 640 pounds to the square foot.

As an example of moderate cost in the construction of a concrete hotel building in winter the McGuire hotel, being erected under the supervision of Architect F. M. Barton, is significant. The building is a five-story structure, measuring 50' x 111' feet of reinforced concrete frame with 8" flat-slab floors, the whole resting on spread concrete footings. The building has been designed according to the Barton system of reinforcement with no girders or floor beams, and will cost \$1.62 per square foot of floor area, which is considered a remarkably low figure for as small a building as this, closely approximating the cost per square foot in large factory buildings.

No less notable than the buildings described in the foregoing paragraphs is the concrete building erected by A. F. Frank for the Dwight Paper Co., a ten-story structure with a ground area of 100' x 126' and resting on concrete caissons 110' deep. This building rose at the rate of a story a week and was occupied Sept. 1, 1911.

The flat-slab floors are used and their thickness is 9.75" and reinforced with half inch rods placed rectangularly and diagonally, thus making a layer of four rods through the panels and over the column heads. The columns were molded from metal forms and reinforced with spiral rods.

The floors are designed to withstand a load of 250 pounds per square foot. Two diagonally adjacent panels—20' 3" x 19' 4"—were tested to twice the live load plus the dead load. The maximum deflection after 24 hours standing was registered at .05" in the center. Stresses in the steel and concrete were recorded by means by an extensometer. The greatest stress in the slab rods was 11,300 pounds and in the slab concrete approximately 2,300 pounds, but the eccentricity of this loading produced stresses in the column of 11,600 pounds in steel tension and the compression in the columns was read at 2,800. The stress in the columns due to eccentric live load on the concrete was close to 1,600 pounds and the tension in the vertical steel column rods was recorded at 11,600 pounds.

The Frank building was designed by Architects Schmidt, Garden & Martin. The building has a veneer of granite, stone and red brick. The walls on the first four floors are plastered. The floor mix was 1:2:4, and the column mix 1:1½:2. The metal forms surrounding the columns produced so smooth a finish that little retouching was required.

Concrete Given Severe Test.

An interesting experiment was recently tried in Kansas City, Mo., which goes a long way to show the endurance of concrete as a paving material under adverse conditions. CONCRETE has a letter from Louis R. Ash, city engineer, in which he says: "Sixth street carries probably the heaviest traffic of any thoroughfare in Kansas City. Toward the end of the year 1910 the asphalt pavement had utterly failed and the street

was in an almost impassable condition. Winter was approaching and I recommended to the Board of Public Works that this street be paved with concrete, since an ordinance to widen the street was pending, passage of which would require a disturbance of any pavement that might be put down. My idea at that time was that this concrete pavement would last until the matter of widening the street could be settled and perhaps form a base for a permanent wearing surface.

"Work was started on this pavement after the weather had become quite cool, and before it was finished the temperature dropped below the freezing point every night. Immediately after being laid the weather became cold, and two weeks after finishing the pavement was thrown open to traffic with about three inches of snow on the surface.

"Because of the hurry necessary to complete the street the old natural cement concrete base was broken up, the stone forked and put into the new pavement. No expansion joints of any kind were provided, and the concrete was composed of a mixture of one cement, two and one-half sand, and four of broken stone, and the pavement was laid in one body, the stone being raked into place and tamped until the mortar flushed to the surface. With the exception of some pot holes which have developed and which were evidently due to bad mixing of the concrete, the pavement has given surprisingly good service. Especially is this true of the eastern half of the pavement where the mixing was better, and where the laying of the pavement was more continuous, the operation being carried on during the night as well as the day.

"No breaking up of the pavement has occurred from expansion or contraction; the only cracking that has been noticed developed within a few days after the pavement was opened to traffic when the temperature dropped to ten degrees below zero. Cracks about one-eighth of an inch wide developed at intervals of about one hundred twenty-five feet throughout the length of the pavement, which is about twelve hundred feet long. These cracks are not noticeable.

"While I would not recommend concrete for heavy traffic, the service that this street has given has demonstrated to my mind that where properly put down, and properly protected until sufficiently hardened, excellent results can be had from this form of pavement.

"Large quantities of concrete pavement are being laid in the outlying districts of Kansas City, and thus far the satisfaction has been practically universal."

The Architectural Commission of the Panama-Pacific International Exposition to be held in San Francisco in 1915, will not fall short of success through lack of efficient architectural advice. The commission consists of Willis Polk, William A. Faville, and Clarence R. Ward, and they have engaged to assist them the firm of McKim, Mead & White, and Henry Bacon and Thos. Hastings of New York, and L. C. Mullgerdt and Geo. W. Kellham, San Francisco.

REINFORCED CONCRETE A COLD WEATHER BUILDING MATERIAL.

In the winter many factory managers and mill agents are confronted with the fact that they must have an increased space to handle a larger factory production. Often this extension is deferred until the spring, as from bitter experience they are aware of the uncertainty of completion of mill constructed buildings due to the slow deliveries of materials and do not consider reinforced concrete either on account of its higher first cost or doubt as to the safety of construction under cold weather conditions. Buildings with steel frames are not considered, as very few factories are built of this design nowadays.

Very often factory managers will incline to mill construction on account of the lower first cost, while in ultimate cost, considering depreciation, insurance, interest, and vibration with its resulting wear on machines, reinforced concrete is cheaper in almost every instance. In winter time concrete work will average from 6 to 10 per cent more in cost than the cost of work done in warm weather and mill construction will cost from 4 to 8 per cent more, but the early occupancy of the concrete building more than offsets the extra cost of concreting in winter, while with mill construction there is absolutely no surety of the completion of the building, four to six months often being taken to finish a building that should be put up in three months.

Reinforced concrete work that has been executed in the coldest weather is just as sound as summer work provided proper precautions are taken. In New England, with its severe winters for the last eighteen years, the Aberthaw Construction Co. has successfully carried through three or four jobs each year. This company is willing to guarantee its concrete work under the most adverse weather conditions.

The principal points of winter concrete work consist in heating the sand, stone, and water before putting them in the mixer. The cement is not heated as its setting is hastened to too great an extent. Salt is sometimes mixed with the concrete in the proportion of two pounds of salt to each bag of cement. Of course all snow is removed from the forms by a steam jet and the whole building as it goes up is enclosed floor by floor with canvas until the concrete is set and salamanders burning coke are placed underneath all freshly poured concrete floors and kept there until the concrete is thoroughly set. In this way the interior of the building is kept about 30 degrees above that of the air outside. The tops of the concrete floors which cannot be enclosed with canvas are covered with about 12 inches of hay or straw, the latter being sometimes sprinkled with salt.

On account of the speed and certainty of erection together with its numberless known advantages it seems that reinforced concrete construction in winter will become more and more adopted by factory owners when it is realized that with experienced contractors the soundness of the structure is just as certain as if it had been erected in the summer time.

DRAFTING OF FORMS EFFECTS BIG SAVING, EVEN ON SMALL PLAIN JOBS.

It is generally recognized that one of the prime reasons for the comparatively high first cost of reinforced concrete buildings is the cost of the material and labor put in the forms. Therefore continued efforts to reduce this item to a minimum are being made by many construction companies. A recent case is illustrative of the possibilities of saving even on small jobs by designing the forms in the drafting room instead of putting the fitting up to the carpenter shop.

The job in question was a small structure costing \$26,000 and 50' x 50', four stories high. The design was of the beam and girder type and was made as regular as possible in order to keep the cost down. In spite of this 113 different kinds of forms were required, making a total of about 600 forms in all taking about 10,000 sq. ft. of stock. When it is considered the figures do not include any of the ledges, studs, or anything but the beam and column sides, it will be appreciated that 113 different kinds of forms is a large number for a plain small job.

According to the Aberthaw Construction Co.'s former methods the carpenters not only made the beam sides but fitted them as they went along, and each one had to be sawed out. A large saving is therefore made by designing the forms for this small job in the drafting room, as the cost of drafting is very much less than the cost of making up the beams and fitting. It is very probable that the failure of new concrete contracting companies is often due to their ignorance of economical methods of handling form work and the case above is an excellent illustration of how they might go astray on their estimate by not realizing the high cost of the many forms on such a small plain job.

Protest Against Increase.

The proposed movement of the railroads in Western Classification territory to increase the freight rates on returned empty sacks and other empty carriers of similar nature is meeting with a united storm of protest. It was proposed to effect this increase in rates by abolishing the returned ratings on these empty carriers, making them take the same rates as brand new articles that had never been of service to the railroads in the transportation of merchandise.

There is now at Galveston a large and efficient representation of traffic managers representing about every line of industry that uses a returnable package, for the purpose of adding their verbal and personal opposition to this move. The men on the ground at Galveston have formed a committee to represent them before the Western Classification Committee, consisting of the following members: F. T. Bentley, Universal Portland Cement Co., chairman; A. L. Griffiths, American Canning Co.; H. E. Waddle, Malsters' Association; H. Van Persyn, Sprague-Warner Co.; T. C. Moore, National Piano Manufacturers' Association; J. H. Guild, Omaha Commercial Club; J. C. MacDonnell, Western Electric Co.; E. J. Perkins, National

Biscuit Co.; Edgar Bogardus, Standard Oil Co.; L. F. Berry, Reid-Murdock Co.

Working with these men is Mr. Bertchy of the Schlitz Brewing Co., who is on the ground as representative of the brewing interests. The decision of the Western Classification Committee is not yet known.

CONCRETE GREENHOUSES

(Continued from page 31)

mann Brothers are now using benches made of concrete lumber, set up in sections.

The bench is described as follows:* It consists of a 6" tapered post having a 10" base, cross beams 49" long, 6" deep and 1½" thick, resting in slots in the post; stringers 6' 2½" long, 4" wide and 2" thick resting on the cross beams; side pieces of "L" section 6' long by 10" high and 1¼" thick with an angle cast at the bottom 3½" wide forming the rest for bottom slabs. There are end pieces of the same section and there are bench slabs 53" long, 9½" wide and 1½" thick resting on the sides and also on the stringer at the center. The bottom slabs lock the whole structure together so that it has all the stability of a monolith. Each member is reinforced both with chicken wire and with several ¼" twisted square bars, except the stringers, which have two ½" bars only. The forms were made by greenhouse employees. All drains and sewers in these greenhouses also are of concrete.

One of the illustrations shows a bench all put together except for some of the bottom slabs, which were left out to show construction, and these pieces were set up by three men in about ten minutes, from the piles of concrete lumber which are seen in the background of the illustration. Other illustrations show the use of concrete block in greenhouse construction on the estate of O. C. Barber, near Barberton, O.

Importance of Studying Mixer Speed.

A great many contractors take the word of the operating engineer of the mixing plant as to results derived by increasing or decreasing the speed of the mixer drum while for some unaccountable reason the latter seem unable to grasp the fundamental principles underlying the operation of a mixer for maximum capacity. A personal investigation by the contractor will often pay, as evidenced by the experience of A. W. Ransome, who recently visited a plant in which one of his 1-yd. mixers was being driven at 11 revolutions, and it required, at this speed, something over a minute and a half to discharge the batch. By speeding up to 19 r.p.m. the batch was discharged in less than 15 seconds.

Mr. Ransome stated that his machines are ordinarily sent out with the engine adjusted to give a mixer speed running from 16 to 20 r.p.m., depending on the size of the mixer involved. The speed for which the

various machines are adjusted is that which will give the best results for the average material. The speed, however, is more or less subject to variation, according as the materials to be mixed vary and as the amount of water used in the mixing may vary. In other words, if the material flows very freely, the speed of the drum should be higher than if the material flows less readily, and, similarly, where a very wet mixture is used, the drum should be driven at higher speed than where the drier and more sticky mixture is handled. The real governing factor is to be found by looking in the drum opening and so adjusting the mixer speed as to get the maximum discharge into the discharge chute, instead of falling short thereof, or carrying over.

HANDLING MATERIALS ON A TEN-STORY WAREHOUSE JOB.

The concrete plant layout and the methods used in unloading, dumping and transporting the raw material to the mixers and hoisting towers, by the Aberthaw Construction Co., Boston, in erecting the large ten-story reinforced concrete warehouse of the Larkin company at Buffalo, N. Y., are well worth attention. The Larkin warehouse will contain 613,000 sq. ft. of floor space, or more than fourteen acres, and the consulting engineers are Lockwood, Greene & Co., Boston and Chicago.

There are two distinct mixers and hoisting towers located at thirds of the building's length. Back of these and across the road kept open to traffic are the cement sheds and stone bins, all of which are connected with the mixing plant by industrial tracks so arranged that the raw material can be brought from any point to either of the mixers. The aggregates are received on the railroad tracks alongside of these buildings.

One advantage of the two towers is that they can be worked independently of one another, being used simultaneously on the different levels to which the forms have been erected, and that one may be used for placing concrete in the ground floor columns while the other is working on the fourth floor.

The warehouse is surrounded by streets on three sides and the streets may not be blocked, and as the railroad tracks are on the opposite side of the street it was necessary to have the raw material bins and cement sheds away from the mixers. The Erie railroad raised no objection to putting pockets beneath the railroad tracks, thus making it possible to unload direct from bottom dump equipment.

The gravel dredged from the Niagara river in the neighborhood of Strawberry island has in it sand and stone in approximately the proportions needed for good concrete work, the sand being slightly in excess, but being of such good quality that tests made with concrete using this aggregate show as good results as average sand with crushed stone and even better results in most instances.

The location of the two cement sheds, one of 4½ and the other 5¾ cars capacity, was arranged so that the railroad cars could be placed on one side of them,

*From *Bulletin* of the Universal Portland Cement Co., to which CONCRETE is also indebted for three of the illustrations showing benches in the Poehlmann greenhouses.

and the industrial tracks serve each shed from between the standard gauge cars and from the street side of the shed. However, all the cement is not unloaded at the sheds, as it is tested at the works of the Crescent Cement Co., Wampum, Pa., by the Pittsburgh Testing Laboratory, and seven-day reports are usually in hand before the cars arrive at the job. In this way the cement can be used direct from the railroad cars, a special industrial track being provided from the back

many as twenty cars per day have been handled by the two plants. It is not expected that the average will be as high as this, but it shows that the plants are large enough amply to take care of the work in hand. Five horsepower motors situated on top of the bins drive these plants.

Five Men Unload Car in One Hour.

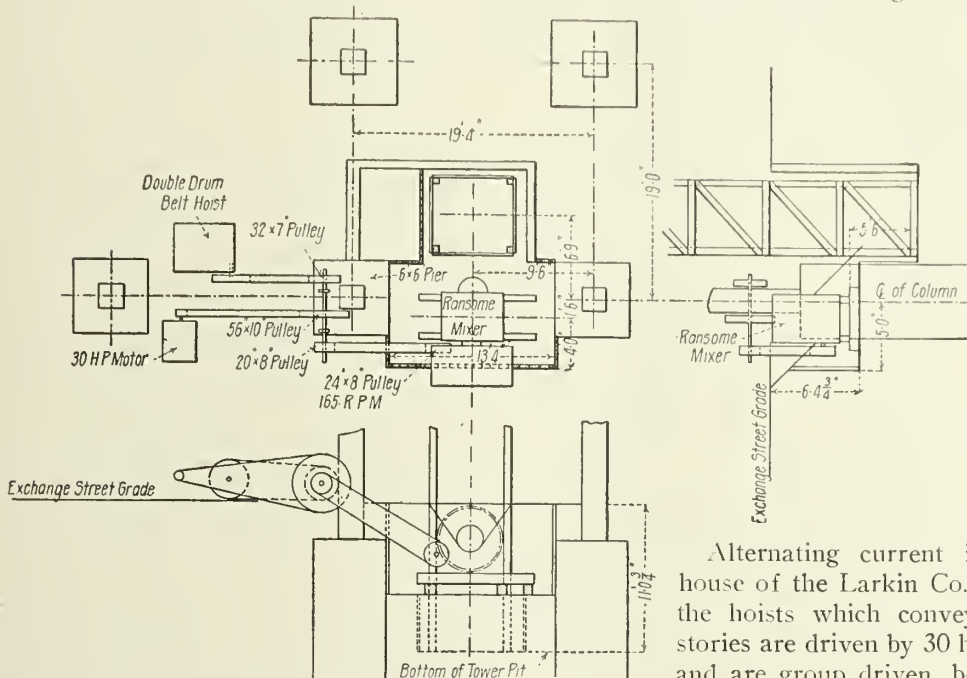
The usual complement of men for using each of the bins for unloading is five, it being found that these five men can care for about a car an hour depending upon how the cars are placed on the tracks. The greatest difficulty is not in the unloading, but the placing of the cars by the railroad and insuring a steady supply of gravel, having in mind the fact that this gravel must be interspersed by cement cars so as to supply both cement and gravel for the work.

Alternating current is supplied from the power house of the Larkin Co. The mixers themselves and the hoists which convey the concrete to the upper stories are driven by 30 h. p. motors. These are belted and are group driven, being double drum belt hoists.

At each mixer two men are steadily employed, one taking care of the charging, adding water, etc., and another cutting the ties of the cement bags and adding the cement to the batches. The men who push the industrial cars from the bins also load from the gate in the bins. This loading is very readily accomplished, the ground gravel running from the bins more easily than would be the case if crushed stone aggregate were used. Four men with two cars keep the mixer busily working without additional help.

Discharging the bucket at the top is usually accomplished without the intervention of any bin, it being arranged that a car is always at the top of the tower to receive the loaded bucket as it reaches the dumping point. While columns are being poured, however, it has been found best to distribute by barrows, so that the concrete is placed around structural steel columns which continue up through the lower stories of the building where the loads are very heavy and does not permit a proper placing when an industrial car containing some eighteen cubic feet is dumped at one time.

Loomis Baldrey has resigned the secretaryship of the Bellingham, Wash., Chamber of Commerce to take a responsible position with the Olympic Portland Cement Co., which is constructing a large factory just north of Bellingham.



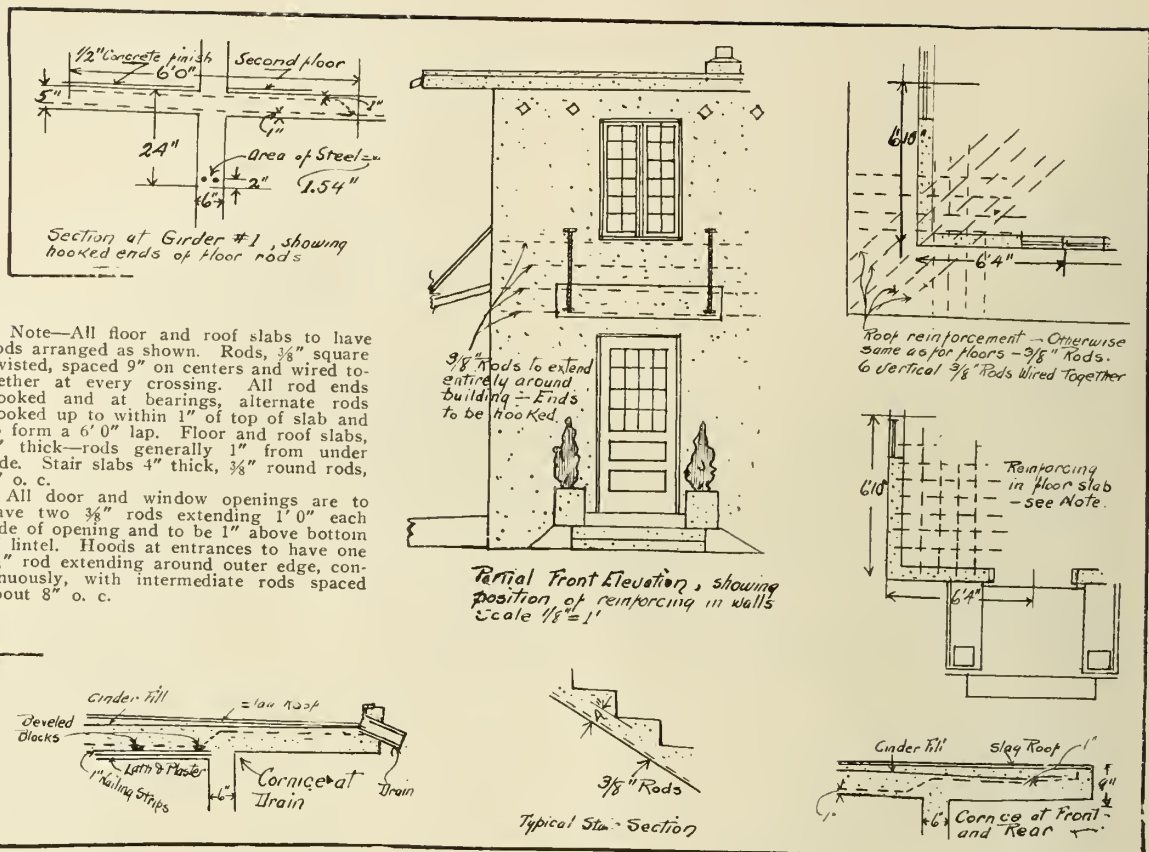
of the cars direct to the mixer platform so that two men can usually take care of all the cement.

Unloading Equipment Inexpensive.

The unloading gravel plant is of the continuous chain and malleable iron bucket type. It is inexpensive so far as the machinery is concerned, the chief expense occurring in the building of the two fifty-ton stone bins. These stone bins are of standard construction and are so made that they can be taken down without drawing of nails. They are so bolted together that they can be removed from one job to another and re-erected with minimum expense.

The loading device which commands these towers contains a heavy shoe, and little difficulty is found in getting the gravel to flow from the bottom dump of the cars into the shoe. It is found necessary, however, to have at least two men shovel out the ends of the cars while one man stops blockades, and a third sees that the plant works quickly and that the buckets are kept filled.

The shifting of the cars is accomplished so far as possible by the railroad company's locomotive. When this is not available, however, the contractors have provided a geared machine running two nigger-heads, one slow and one medium speed. This equipment is motor driven and can be started and stopped by the man who tends the placing of the cars. A rope haul moves the cars to position and moves the empties out on the second track which is usually kept clear by the railroad so that the empties may be taken away. As



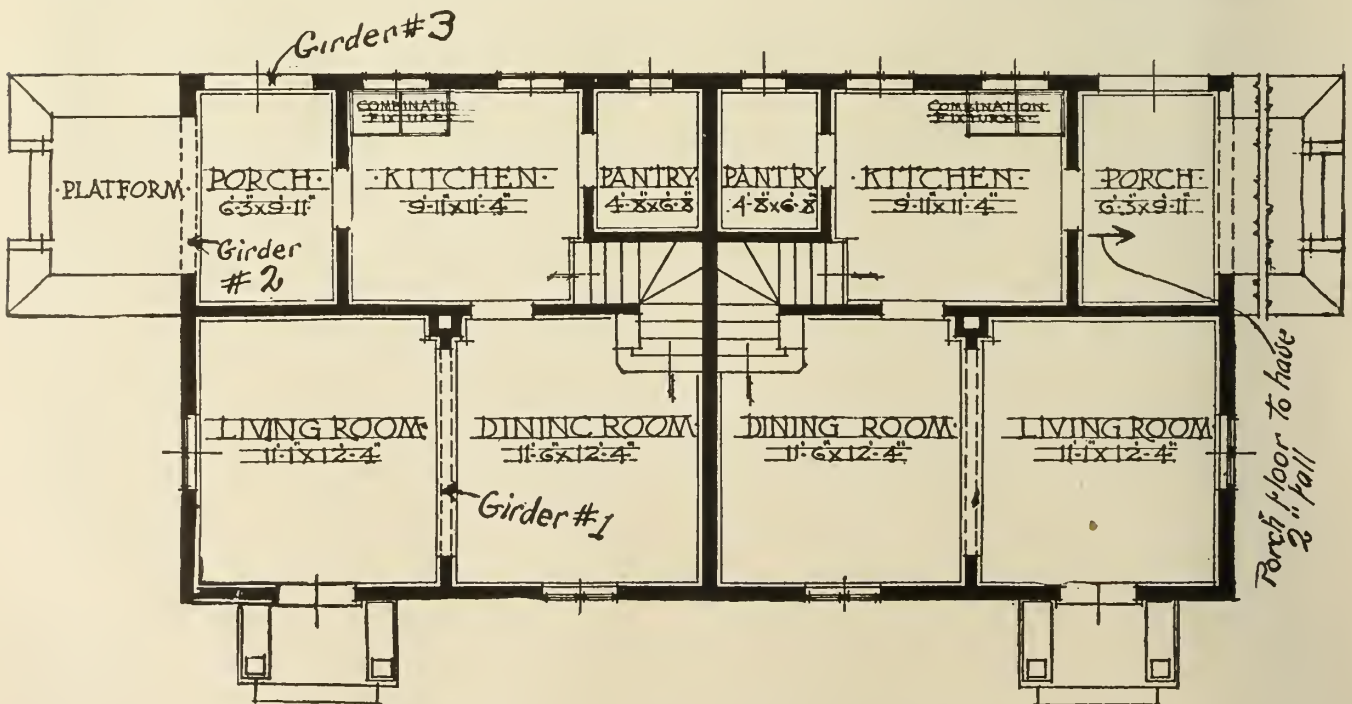
MODEL VILLAGE FOR MINERS

(Continued from page 40)

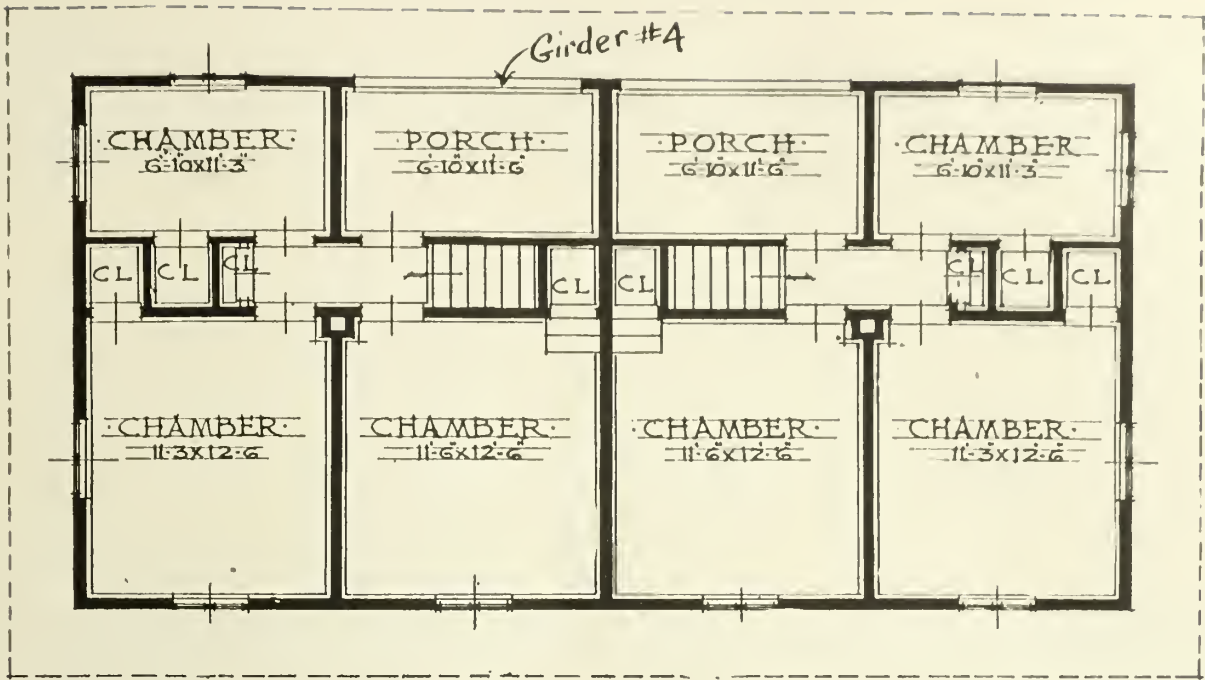
construction of floors and roofs which are also of reinforced concrete.

A novel system of building has been adopted in this group of houses. A railroad track was laid around the entire square; a mixing plant was

mounted upon a flat car with an elevator for hoisting concrete attached. Cars of sand, cement and cinders are attached to the mixing car, the concrete is hoisted from the mixer to an elevated hopper from which spouts conduct the mixture into the steel forms at the various parts of the building. No



First Floor Plan of Miners' Houses. See detail as to girder No. 1. All girders are 24" deep; girders Nos. 1 and 4 are 6" wide and girders 2 and 3 are 8" wide. Areas of reinforcing steel in girders are as follows: No. 1, 1.54"; No. 2, .98"; No. 3, .60", and No. 4, .98".



Second Floor Plan Miners' Houses

scaffolding is used. The forms support planks for runways.

After a section of one house is completed the mixing train moves to the next and the process is continued. The whole arrangement is simple and free from complicated mechanism. Hydrate of lime is added to the concrete for density and to weather-proof the mixture. The monolithic construction will stand much as the molds leave it. There will be no finish inside, other than a waterproof paint of light buff color and an exterior treatment, consisting merely of a "splattering" of a mix of white

cement and sand. Every effort is being made to keep the cost down.

It is expected the work will be completed in the spring. Seven of the houses are up past the second floor level, while only the foundations of the others are completed.

Adjoining this group of dwellings and located on a high plateau, an attractive group of concrete bungalows will be constructed for the superintendent and foremen of the mines. Best of all, in this new construction, is the fact that these attractive homes will be very inexpensive, even cheaper than less sanitary and far less attractive houses of frame. In striking contrast to the dingy, unsanitary hovels, now called home by some of the miners, will be the new model cement city.

The illustration below shows poured concrete houses and cottages erected at Highlake, a suburb of Chicago, Ill. Courtesy Universal Portland Cement Co.



INFORMATION DEPARTMENT

Inquiries regarding sand and all other materials are cheerfully answered, like all other questions, but in cases of importance it is best to invest in a laboratory analysis. Write to us for particulars, address, Laboratory Department.

Granite Dust.

Where can I get dark gray granite dust for facing concrete block? B., Ohio.

See advertising pages of CONCRETE. Use screenings but NOT dust.

* * *

Use a Level.

I am putting up a three-flat building. I would like to get the concrete foundations level in some other way than by employing a civil engineer. M., Massachusetts.

We suggest that you use a level. See the advertising pages of CONCRETE.

* * *

Reinforced Pipe.

Would you advise the use of a waterproofed reinforced concrete pipe for a water main $7\frac{1}{2}$ or 8 miles long with a water head at the end of 486'? B., Quebec.

We cannot advise the use of reinforced concrete pipe for a water main $7\frac{1}{2}$ or 8 miles long with a water head of 486'.

* * *

Concrete Smokestack.

I want to build a smokestack of concrete block. The stack must be large enough for two 80 h. p. boilers. The machine I have makes a block 8" by 8" by 16". How high should the stack be and what should be the thickness of the wall? C., Indiana.

Our advice is that you refer the matter to an engineer who can give it his personal attention.

* * *

Sample of Gravel.

Enclosed in a separate package I am sending you a sample of gravel as taken from a gravel bank. I would like to know if it is too dirty for use in concrete. C., New York.

We should not care to recommend the use of this gravel in any concrete unless it was first carefully washed. There is certainly a high percentage of dirt in it.

* * *

Hydrated Lime.

Please tell me what hydrated lime is. I., California.

Hydrated lime is commercial lime subjected to the action of clean water until the lime is thoroughly slacked, the water afterwards being driven off and the lime reduced to fine powder. Quick-lime in sizes of 1" and under, is used and the water well stirred into it. The heat generated drives off the water, and the residue, if not sufficiently fine, is ground to powder.

Bake Oven of Concrete.

Will it be practicable to consider a bake oven 10' by 20' of concrete? D., Washington.

We cannot recommend the use of concrete in the construction of a bake oven. If such an oven were to be built, it should consist of two concrete shells, one surrounding the other, with an air space between, and the concrete should be carefully reinforced to take care of great temperature changes.

* * *

Removing Concrete from Mixer Drum.

How shall I remove a rich concrete mixture about $\frac{1}{4}$ " thick from around the drum of a batch mixer? I do not want to put anything on to remove the concrete that will injure the iron. A., Michigan.

We suggest that you build a light wood fire inside the drum of the mixer to heat the layer of concrete, and when it has become well heated dash on some water, cooling it quickly. The quick change will probably crack off the coating of concrete.

* * *

Small Concrete House Plan.

I want to build a house in the spring and I want one something on the style of the home built by Lewis Healy, Otsego, Mich., illustrated in the November, 1911, issue of CONCRETE. I want only four rooms, however, two rooms downstairs and two rooms upstairs—no bath room. I want the whole house to be only about 18' x 24', exclusive of porch. Can you tell me where to get plans for such a house of concrete? B., New York.

We are referring your inquiry to Jens C. Petersen, architect, Traverse City, Mich., who plans a great many houses in concrete. We believe he may be able to suggest a plan which will meet your needs.

* * *

Concrete Flue Lining.

I would like to know if there will be any objection to the use of a 12" concrete drain tile for a flue lining in a residence chimney? C., Michigan.

We know of no reason why concrete tile should not be used for flue lining in a residence chimney. There are several machines on the market for making concrete flue linings. These linings are square but there is no reason that we know of why an ordinary drain tile should not be used for the same purpose. There is nothing essentially different in the composition and we believe it should answer the purpose.

* * *

Roof of Ordinary Plaster.

I should like your opinion of a small barn and a poultry house with roof constructed as follows: Ordinary wooden lath nailed on 2"x4" lumber and covered with ordinary plaster with hair added, and then covered with tar paint to make it waterproof. Would a roof of this kind be durable? Would it be cool in summer and warm in winter? O., Nebraska.

Ordinary plaster will not shed water. We suggest that you cover the rafters with expanded metal mesh and then cover this expanded metal with Portland

cement plaster, mixture of about 1:2, and preferably with some good waterproofing compound introduced into the mixture. See advertising pages of CONCRETE.

Such construction should be used not only for the roof but for the walls of a poultry house, as is frequently done. Be sure to get a dense mixture of plaster so that it will shed water.

* * *

Expansion of Concrete.

I should like to know something about the expansion which may be expected in a 100' concrete wall 8' high reinforced with $\frac{3}{4}$ " mild steel longitudinally, steel spaced every 16", and the wall to be 8" thick. What would be the expansion without reinforcing? This wall will be exposed to the weather on both sides. P., Missouri.

The coefficient of linear expansion of concrete is .0000055. This corresponds to the expansion of about $\frac{1}{3}$ " to 100' of concrete for every 50° of temperature.

The presence of reinforcement in concrete to the extent of as little as 2/10 to 4/10 of 1 per cent of the steel based on the cross-area of the concrete is figured to take care of temperature or shrinkage cracks.

You will find this subject discussed at length in the Taylor & Thompson book, *Concrete, Plain and Reinforced*, which retails for \$5.00.

* * *

Building Concrete Dam.

I would like information as to building a concrete dam across a canyon, to hold water for irrigating purposes. The walls and the bottom of the canyon are of solid granite. The dam I propose to make is 6' wide at the bottom and 3' wide at the top and 10' high. I can build my forms right across the canyon because I have no water to contend with at this time of the year. Will you give me some information as to how to proceed? W., Arizona.

We cannot attempt to direct you in building this concrete dam. Work of this kind should have the attention of an engineer who can see to it that the design meets the proper requirements of the soil, the formation of which we cannot judge at long range. We suggest that you refer the matter to a competent engineer and take his advice.

We would like very much to help you but we cannot take the responsibility in this case when it is impossible for us to know all the conditions.

* * *

Depth of Foundations.

I have two customers who want concrete walls and floors built on clay soil where there is little drainage. The walls are to be just high enough to get the buildings well off the ground. How should the foundations be built to prevent heaving by frost? Some low walls in these sections have been built right on top of the ground without any trench, but I am not sure this would be a good plan in this case. B., New York.

To avoid heaving by frost the foundations should be set either four or five feet below the surface for a large and important building, or just below the grass roots for a small building. The importance and cost of the building should determine this matter.

If you go below the grass roots, then go below the frost line. A shallow depth does not take you out of the weathered soil which is always just porous enough to gather and retain moisture, which will freeze and cause the ground to heave.

Sand, Sample of.

I am sending by mail a sample of the only local sand we have. What do you think of it for concrete blocks and general concrete work? M., Texas.

We have also examined with care the sample of sand you submitted. This appears to be a fair grade of rather fine but quite hard silica sand which, however, contains a percentage of clay which should be carefully washed out of the sand before it is used. Our chief criticism of the sand is that it runs too fine for the best results in concrete work. We can make a granular-metric analysis of this sand which will show you exactly how much material of given sizes should be added to it or subtracted from it in order to make it the most economical in the use of cement and at the same time produce the strongest concrete. Our charge for this work is \$6.00 and we shall require a quart of your sand which should be sent us carriage prepaid.

* * *

Oil Concrete.

Where can I get information as to oil mixed concrete? P., Pennsylvania.

The value of mineral oils in concrete has not been so definitely determined that the practice of using such oils in general concrete work can be recommended.

In the February, 1910, issue of CONCRETE, an article was published on this subject written by Albert Moyer, Vulcanite Portland Cement Co., Flatiron Building, New York City, and we refer you to that issue of the magazine. We also refer you to a mention of this material, page 77, in the February, 1911, issue of CONCRETE, which refers to experiments made by Logan W. Page, Director of Office of Public Roads, United States Department of Agriculture. We believe that if you will write to Mr. Page he will be glad to give you some information, although these experiments are by no means complete.

* * *

Books on Silos, Bridges and Culverts.

Where can I get the books mentioned in CONCRETE: "Concrete Silo Construction," a bulletin of the University of Wisconsin, and "Highway Bridges and Culverts," issued by the Office of Public Roads, United States Department of Agriculture? S., Wisconsin.

The pamphlet entitled "Concrete Silo Construction" published by the University of Wisconsin Agricultural Experiment Station, may be obtained by addressing this Station at Madison, Wisconsin. We believe this is given for the asking, to residents of Wisconsin.

The booklet "Highway Bridges and Culverts," published by the Office of Public Roads, United States Department of Agriculture, and designated as Bulletin No. 39, is given merely for the asking, unless the supply is exhausted, in which case you may obtain the pamphlet, in all probability, from the Division of Publications, Washington, D. C., for the nominal sum of probably five or ten cents.

* * *

Pressure Tank of Concrete.

I have a temporary water system working by gravity, but owing to the fact that the water gets too warm in the tank in summer and freezes in the winter, I am contemplating the installation of an underground pneumatic system, and I would like some information as to whether concrete could be used in making a pressure tank—that is,

if $\frac{1}{2}$ " mesh woven wire laid in a 4" wall of 1 cement to 2 sharp coarse sand, will serve the purpose. J., Virginia.

It is impossible to give you any information about the strength of the tank walls which you say will be 4" or of the sufficiency of the reinforcement, which you say is a $\frac{1}{2}$ " woven wire, until you give more data. It is absolutely necessary to give the exact inside dimensions of the tank. The diameter if round, or the length, breadth and height, if rectangular, all govern the pressure and this governs the thickness of the walls and the amount of reinforcement. The unit pressure, which is only a starter in the calculations, will be 15.15 lbs. per sq. in. with a head of 35'.

* * *

To Toughen Concrete Shingles.

I would like to know what I can include in the composition of concrete shingles to toughen them.

Ornamental Concrete.

I would like information as to a compound for making ornamental objects of concrete in plaster molds. M., Indiana.

We know of nothing to toughen concrete shingles but asbestos fiber. The use of this in conjunction with cement in making shingles is a patented process, however, controlled by Keasbey & Mattison, Ambler, Pa. Practically all concrete roof tile and shingles are made without any such mixture.

As to a compound for making ornamental objects, a concrete mixture for such uses varies with the ornamental object to be made, and we know of no general answer which can be given to this question. Several books are published, however, on making ornamental objects of concrete, and we have sent you our book catalog.

* * *

Face Down Block Machines.

Will you please tell me about what year the first face down block machine was put on the market and who made it? Also tell me what advantage the face down block machine has over others? G., New Jersey.

So far as we have been able to learn, the first face down machine was probably that manufactured under the patent issued to Borst & Groscup in 1903. The present owners of this patent are the Ideal Concrete Machinery Co., South Bend, Ind., who can doubtless furnish you with absolutely definite information, or you can secure definite information from the records of the patent office, Washington, D. C., on application.

The chief advantage claimed for the face down machine is that it permits the facing material to be deposited first in the mold where it is thoroughly tamped, and compacted by the weight and tamping of the coarser backing material which is ordinarily used to form the body of the block.

* * *

Coloring Matter in Concrete.

Our county engineer says that coloring matter in concrete sidewalks weakens the concrete, and as I am interested in the construction of concrete sidewalks I would like to have your advice in this matter. M., California.

The county engineer who advises you as to the use of coloring matter in concrete sidewalks, is doubtless in a measure correct.

Any substance added to concrete which does not add to its stability is detrimental to best results, but we believe you would have no trouble in using a reason-

able amount of coloring matter in concrete walks, as is very frequently done, and is being done by good contractors in many places.

We believe it is permissible to use as much as three to four pounds of lamp black or mineral coloring matter to one hundred pounds of cement. To get an ordinary gray concrete you will not need more than about two pounds of lamp black, but you do not tell us what color you want to produce so we cannot advise you definitely along this line.

* * *

Repairing Floor.

We have partially completed a floor 200' by 100' but we were caught in the early freeze a few weeks ago. The first of the floor was frozen just a trifle and now about $\frac{1}{16}$ " of the finished floor is cracking off. The owner insists upon a smooth finish. What shall we do about it? W., Nebraska.

We suggest that about the only treatment in such a case is to go over the entire floor and chip off all of the bad concrete, afterwards carefully removing the loose particles.

After this is done, go over the surface with muriatic acid, in a 10 to 15 per cent solution with water, the acid being used to etch out the old concrete so that there may be a good bond with the new. When this is done, go over the surface again with clean water, washing it thoroughly, then make your top coat of a 1:2 mortar and cover the old floor to a depth of $\frac{1}{2}$ ", doing just as little troweling as possible, as troweling brings particles of cement to the surface and gives a top coat which is readily worn off.

* * *

Strength of Concrete Block Walls.

I should like to know something about the strength of concrete block walls. What is the crushing strength of a hollow block made of a mixture of 1:5? The block is 8" x 12" x 16". Would a 12" wall made of such block be strong enough for the foundation and basement story of a large barn? P., Minnesota.

It is impossible to say what crushing strength block made on your machine should have. The strength of a block depends not altogether upon the machine in which it is made nor upon the proportions in the mix—the quality of the aggregate in the mix and the concrete have a great deal to do with the strength. Concrete block should certainly have a crushing strength of 1,000 pounds to the square inch, at the very least, if they are good block, and if great care is exercised in the selection of the aggregate, the strength should be very much higher than this.

We cannot give you any very definite information, because you do not give us any very definite information as to the barn.

* * *

Needs of Insulation.

We have completed a building 40' by 60' having a concrete roof. We put the roof on without any tiling and when the heat strikes the under side it has a tendency to draw the frost and it drops on the floor of the room. What would you advise us to do about it? Rain doesn't come through the roof in the least. H., Wisconsin.

It appears that your difficulty is not from moisture going through the roof, because you say no moisture comes through when it rains. We believe that the trouble is due to condensation—not because the heat on the inside draws the frost through, but because the

heated air inside the room contains the moisture, and when it comes in contact with the uninsulated roof, which is cold, it condenses just as it condenses on a window pane.

Your remedy lies in creating an inner surface for the roof which will have a temperature more nearly like that of the room itself. We suggest that you fur your concrete roof on the inside and plaster, leaving an air space. The air space in the roof will supply insulation which will prevent this condensation.

* * *

Making Dead Air Space.

I have been told that the use of a zinc plate in the first layer of blocks above the ground in a concrete block building will prevent dampness. Can you give me some information? G., Illinois.

If the foundation above ground is built of solid concrete block, no such plate is necessary. If the foundation is of hollow block, some sort of a plate or a shut-off is advisable. The same is true of the tier of block just below the roof plate, if hollow block are used in the wall. The idea is to have a dead air space in the cores of the block which make up the wall above the foundation and below the roof plate, but it is not at all necessary to use zinc plate in order to seal up the block. Zinc is rather expensive. If you use an iron plate just large enough to cover the cores of the block, embedding this in the Portland cement mortar in which the block are laid, it should serve the purpose. Many builders who use hollow block in the walls of houses use a course of solid block at grade and just below the roof plate. This serves a similar purpose in creating a dead air space in the wall.

* * *

Concrete Loft Building.

I am considering the erection of a six-story loft building 50' by 100' and would like information as to advantages of concrete construction for fireproofness, and other benefits. D., New York.

We are sending copy of the January, 1912, number under separate cover, and we call your attention to the leading article on concrete industrial buildings.

As you will see by a foot note, this article is an abstract from a chapter in a book just published by the Association of American Portland Cement Manufacturers, Land Title Bldg., Philadelphia, Pa. The book is printed on excellent paper, contains more than 200 pages, and as it costs only 50c we think it would be worth your while to buy it, if you are considering the erection of a reinforced concrete building.

We believe that you will also be interested in an article by J. P. H. Perry published in the May, 1911, issue of CONCRETE along this same line. We are sending this number to you, also. If we can be of service to you in supplying detailed information, do not hesitate to call upon us.

* * *

Fireproof Dwelling—Concrete Floors.

I am thinking of building a fireproof dwelling and I should like to know something of the practicability of concrete floors. I had thought of putting hard wood on the first floor and concrete on the second and the third floor, which will be given up chiefly to bedrooms. I think that concrete would be more sanitary because more easily

kept clean. Information along this line will be appreciated. W., Iowa.

There is no question about the practicability of using concrete floors in houses. Concrete has been used in this way in many instances.

You are certainly right as to the many advantages which such floors would have in sleeping rooms, and other rooms of a house. It is possible to give concrete floors a very attractive finish in many ways, and if you want practical information as to the construction of such floors, we shall be glad to help you out.

The November, 1911, issue of CONCRETE contains a mention of the prize house, so called, built in a suburb of Chicago, for Miss Lillian Williamson, who was winner in a recent contest in Chicago in 1910. The floors of this house are of concrete attractively finished. On the other hand, some people, merely because they do not like the feeling of concrete, put wood floors over the concrete. This is entirely a matter of personal preference.

* * *

What Concrete Mix Was Used?

A contractor took a job of cementing the walls of a pit 50' long, 8' wide and 12' deep, with walls 16" thick at the bottom and 8" thick at the top, or an average thickness of 12". The contractor used 160 sacks of cement and says he used a 1:6 mix. I figure there are 52 yards of concrete. What do you figure the mix really was? S., Colorado.

Your question is one that is not uncommon. Your job calls for about 52 cubic yards of concrete and you say that 160 bags of cement were used on it. Ordinary usage figures that a bag of Portland cement is equivalent to one cubic foot. There are, of course, 1404 cubic feet in 52 cubic yards. Now, if 160 cubic feet of the total is taken up with the Portland cement, there remain 1244 cubic feet to be filled with aggregate. If such a thing as absolutely voidless aggregate were obtainable, and an ideal mix were made, you would have a mix leaner than 1:8. Under ordinary conditions, voids always exist, and in our judgment the proportions you have been using were at least as lean as 1:10, certainly much too lean for good concrete work in walls.

If you can tell us definitely the percentage of voids in the material used with the Portland cement, we can of course tell you very closely the mix, but the foregoing is probably a fairly close estimate.

* * *

Waterproofing Pump Pit.

One of our correspondents in Cuba writes as follows: "Am having considerable trouble with water getting into the pump pit. The pump is 10' below the level of the ground and the water comes through the concrete walls. Do you know of any preparation that could be put on the walls to keep out the water?" We should greatly appreciate it if you will give us the benefit of your knowledge of such matters, so that we can help our correspondent. O., Pennsylvania.

We should like very much to help you in this matter but we can give no very definite advice because we do not know the exact conditions. If there is no great head of water some simple method of waterproofing the walls may be enough. On the other hand the water may be under considerable pressure, and if it is it will undoubtedly be necessary to strengthen the walls

against the head of water in addition to using a waterproofing material of some kind. We suggest that you refer your correspondent to an article by Ernest McCullough on waterproofing basements in the January, 1912, issue of CONCRETE, and we also suggest that you recommend to your correspondent that he write to the advertisers of waterproofing materials and methods whose names and addresses will be found in CONCRETE, a copy of which is being sent. We know that he will get valuable advice when he has told them the exact conditions with which he is contending.

* * *

Concrete Stack.

We want to build a concrete smokestack for the power house of the water works here. It will have to be 3' in diameter inside and about 55' high. We understand there is a patent on the double wall flue method of construction, and we would like to know some other way in which it can be built without infringing on a patent. K., Michigan.

The design of a concrete chimney such as you propose to erect is entirely too important a matter to take up in the course of such correspondence as this. We should like to help you in a letter on this subject, but it would be a very long job to go into details of the design and construction of the chimney.

However, we suggest that the book *Reinforced Concrete, A Manual of Practice*, may be of use to you. It contains a clear exposition of the design of reinforced concrete chimneys. Our book department can supply this volume for \$1.50 postpaid. We also suggest that for more general information on the subject of chimney construction in concrete, you might be interested in Bulletin No. 18, published by the Association of American Portland Cement Manufacturers, Land Title Bldg., Philadelphia, Pa. We believe that the Secretary of this Association, Percy H. Wilson, will send you the bulletin on receipt of 5 cents.

* * *

Concrete House Boat.

I expect to build a concrete house boat next spring, 60' long and 20' beam, using a reinforcing mesh. Do you think walls $2\frac{1}{2}$ " inches thick will be heavy enough? P., New York.

We should be very glad to give you information for which you ask in building a houseboat, but we do not care to undertake details of design which should be gone over by an engineer who has all the data for the proposed craft available.

In our book *How To Use Concrete*, which you will find listed in our book catalog, the building of a boat of concrete is described. Large scows are now used by the government of the United States, built of this material, and there is no reason why a houseboat should not be built of concrete.

We suggest that you probably can get the information which you want by writing to the manufacturers of expanded metal fabric. You will find these manufacturers' names and addresses in CONCRETE. These manufacturers will be very glad to tell you what kind of fabric you should use and they probably will figure for you what thickness the walls should have in order to make the boat strong. The Engineering Departments of these companies are always glad to answer such questions and they can do so intelligently because

the construction depends altogether upon the metal used and the size of the boat.

* * *

Chloride of Calcium.

I should like information as to the use of chloride of calcium in hastening the setting of concrete. P., Maryland.

Extensive experiments done in concrete work under severe weather conditions, in which the temperature has been low, show that the use of calcium chloride furnishes a safeguard against the dangers ordinarily attendant upon concrete work in cold weather. It has been found that the addition of two (2) per cent of calcium chloride to the water with which concrete is mixed has the effect of making the resulting cement mortar as strong as that made in a warm room, with a temperature of 60 to 70 degrees Fahr. About 10 to 15 per cent of water is ordinarily used in making concrete. Calcium chloride is a very deliquescent salt, that is, it dissolves very readily in water, for which it has a very strong affinity. The effect of the addition of the calcium chloride to the water is to make a 15 to 20 per cent solution of the salt, which has a freezing point of from 14 degrees to 1 degree below zero, Fahr. When used in considerable quantity, the effect of calcium chloride is to quicken the setting time of Portland cement. A 10 to 20 per cent solution is generally used for this purpose and has a tendency to quicken the setting greatly without ill effect. It probably would have no effect on the time of setting in cement that had become slow-setting through storage.

* * *

Use of Sand Blast and Stucco.

I should like some information as to stucco work. I intend to stucco a building that was erected about three years ago of concrete block. The block were faced with white limestone and Portland cement. We polished these block with sandstone, giving a very fine appearance; but when they were six months old they began to hair crack quite badly. To cover up this defect we then tried several different concrete paints, but they have not been a success. To go over the block with a chisel would be a big job as there are about 5,000 square feet of wall. Is there a machine with which to sand blast a building much the same way as granite is treated? Will it be necessary to plaster the walls before the stucco is applied? C., Ohio.

You can use a sand blast in preparing the walls of your building for stucco. Of course, we are confident that there are plenty of surface finishes on the market which could be successfully applied to your walls, obviating the necessity for stucco.

In case you want to get the stucco effect you have only to roughen the concrete surface in order to insure a bond between the wall and the stucco. If your wall surface is even, you do not have to plaster before stuccoing. The object of the plaster would be to bring the wall to an even surface in case the block were of rock face design.

You can secure sand blasting apparatus from the J. W. Paxson Co., Philadelphia, Pa. When your surface is prepared, make sure to wet it thoroughly just before the stucco is applied.

Granite screenings should be excellent material for use in a stucco mixture. Of course, the coarser the particles, the rougher the stucco surface will be.



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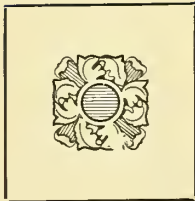
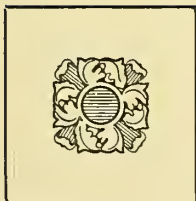
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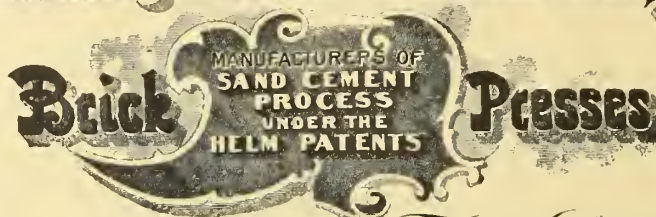
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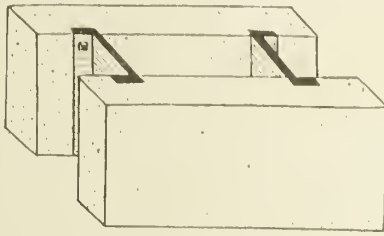
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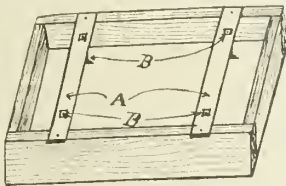
PATENT SECURED ON ANOTHER TWO PIECE CONCRETE BLOCK.

Methods of securing a continuous air space in concrete walls are very numerous and CONCRETE is always glad to report another idea along this line. John M.



New Two-Piece Block

Crocker and Frank Tappan, Coldwater, Mich., have secured a patent on a design of concrete block to give a continuous air space, and the idea is illustrated in the two sketches reproduced here. The block really consists of two concrete blocks separately cast. They may be made in a mold box like that illustrated. The two



Mold Box—A, bands to make grooves;
B, bolts to be embedded

bands across the mold box leave grooves in the inner faces of the block in which a piece of channel iron is fastened by means of bolts and nuts, the bolts being embedded in the block when it is cast. The arrangement is a very simple one.



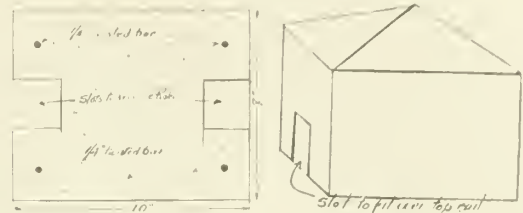
The concrete block house shown in the illustration was designed by Wherry and Happe, Architects, Mitchell, S. D., and was built in that place by G. Scheurenbrand, for Dr. R. C. Warney. Universal Portland cement was used.

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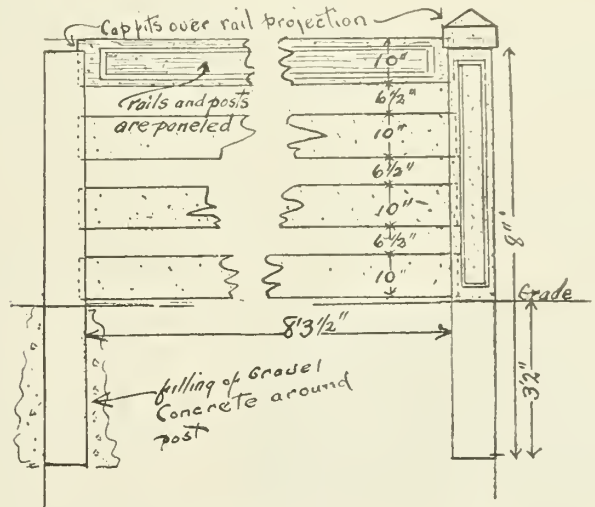
(Continued from page 35)

plastered over instead of putting in wooden spacers temporarily, and filling the slot with concrete mortar. A cross-section of a post is like the letter "H" which is 8" across the top and base and 10" in height. The 10" dimension of the post lies in the direction of the fence. In each corner, or in the end of each arm of



Cross Section of Post and Cap for Post

the "H," forming slots on each side, is a bar of $\frac{1}{4}$ " twisted steel. The fence, as erected, is 5' 2" high. The uppermost of the four rails, which are $6\frac{1}{2}$ " apart, projects above the post and the concrete caps, have slots in them which fit over the projecting edge of



Elevation of Fence

the rail. In going up and down grades, posts were set erect. The rails were mitered at the ends to conform to the angle at which the fence lay on the slope.

Have you copies of the August, October and November, 1911, issues of CONCRETE? We are willing to pay 25c each for a limited number of these magazines. We need them to complete our files. We are willing to pay 15c each for a few copies of the issues of CONCRETE as follows: January, February, March, May and July, 1911, providing the magazines are in good condition. Address, Concrete Publishing Co., Detroit, Mich.

COST OF CONCRETE BRIDGES OF THROUGH GIRDER AND SLAB TYPES.*

BY B. H. PIEPMEIER.†

Previous papers presented to this society by A. N. Johnson, State Engineer of the Illinois Highway Commission, also by Clifford Older and H. E. Bilger, engineers of the department, have clearly set forth the manner in which engineering services are rendered on bridge matters by the Illinois Highway Commission to the various township, county and municipal officials throughout the state. Mr. Johnson's papers will be found in the twenty-third and twenty-fifth annual reports, pages 79 and 126, respectively. Mr. Older's papers may be found in the twenty-third report, page 100, and Mr. Bilger's may be found in the twenty-sixth annual report, page 71. These papers give a description of the concrete slab and the through girder type of reinforced concrete bridges that have been developed by the Commission as the type best suited to the particular conditions prevailing throughout Illinois. They also discuss the design of the slab and the girder concrete bridges, as well as give some cost data. Anyone who is not familiar with the practice of the Commission is referred to the last report of the Commission, which may be obtained upon written application.

The purpose of this paper is not to discuss the practice of the Illinois Highway Commission in the design of concrete highway bridges, but to develop a ready means of ascertaining the approximate number of cubic yards of concrete in a completed structure of a known span, height of abutments and length of wings, as well as to develop a means of making preliminary estimates of the cost of completed structures without calculating the quantities in detail.

The bridge work of the Commission requires a personal inspection of the bridge site with the local officials, and at this meeting the necessary data are obtained for the design of the bridge. Almost invariably the officials expect that an estimate of the cost of the proposed work be given them at this time. Consequently, it is desirable to be prepared to give an estimate of the proposed bridge that will closely approximate the one that is made from the detailed drawings. This is usually a somewhat difficult matter unless the time is taken to compute the number of cubic yards that will be in the bridge.

With the increased interest in concrete bridge work the past four or five years, it is needless to say that the Commission has been called upon for engineering assistance more frequently each year, until today it is almost impossible to meet all the requests. For this reason a system of standards was devised and all computations tabulated. This greatly improved the office efficiency and made it possible to answer a larger number of requests.

Again, in our office it has been necessary to do considerable figuring to determine the best make-up

for a bridge. Frequently a series of small slabs on piers would sum up much cheaper than the larger spans, and vice versa. It is sometimes advisable to compare a steel bridge for the same site. With the curves that were worked out by Mr. Bilger and presented to this Society last year on the cost and the number of cubic yards in substructures for steel bridges, we are able to get a very accurate estimate of the cost of a steel bridge complete. It, therefore, became desirable that some ready means be devised for determining the approximate number of cubic yards in concrete slab and girder bridges for both office and field use.

From the large number of computations we have made of various concrete bridges, it was thought possible that a complete tabulation of quantities or a system of curves could be worked out that would enable one to determine readily the contents of either the slab or the girder type of bridges. It is proposed, therefore, to correlate all computations and data on the flat top type of bridge, and to arrange it in a convenient form for both office and field use in determining the number of cubic yards in ordinary bridges, besides obtaining an approximate estimate of the cost. Before proceeding, however, it may be well first merely to outline in a general way the slab and the girder bridges as designed by the Illinois Highway Commission, and give a few dimensions that you may better understand the types of bridges under consideration.

Types of Bridges.

For reinforced abutments for slab bridges the main wall is made 12" thick from top to bottom, the steel reinforcing being placed on the stream side, and the percentage of steel increased as the height increases. The abutments rest on an 18" reinforced footing, which is made of sufficient size to allow but 3,000 pounds per square foot bearing on the foundation. When a soft foundation is encountered, this same size footing is usually sufficient to permit the proper spacing of the required number of piles. The reinforced wings for slab bridges are of the standard cantilever type, the base being 33 per cent of the total height. The wing wall proper is 12" thick for heights up to 16'. For greater heights the base of the wall increases in proportion to the height. Nearly all wings for this type of bridge have a drop of 18" to 5' at the end to conform to the 2 to 1 slope on the sides of the road. I may say here that the cantilever type of wing for extreme heights has been found much more satisfactory than the buttress type, as the increased thickness at the base and the large percentage of steel does not equal the extra cost of forming necessary for the buttress type.

Reinforced concrete slab bridges are designed with various roadways, ranging from 16' upward. The side rails usually average 8" thick and 3' 6" high. On this type of bridge the slab and the side rails come flush with the back of the abutment walls. The top of the wings comes up along the outside of the rails to catch the side slope on the road. In determining the thickness of the slab, its entire dead load is considered, the

*Presented before Illinois Society of Engineers and Surveyors, January 19, 1912.

†Assistant Engineer, Illinois State Highway Commission.

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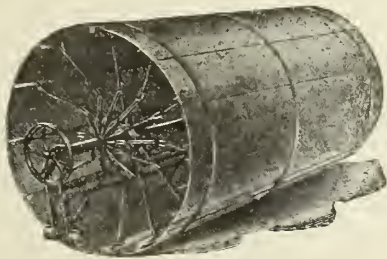
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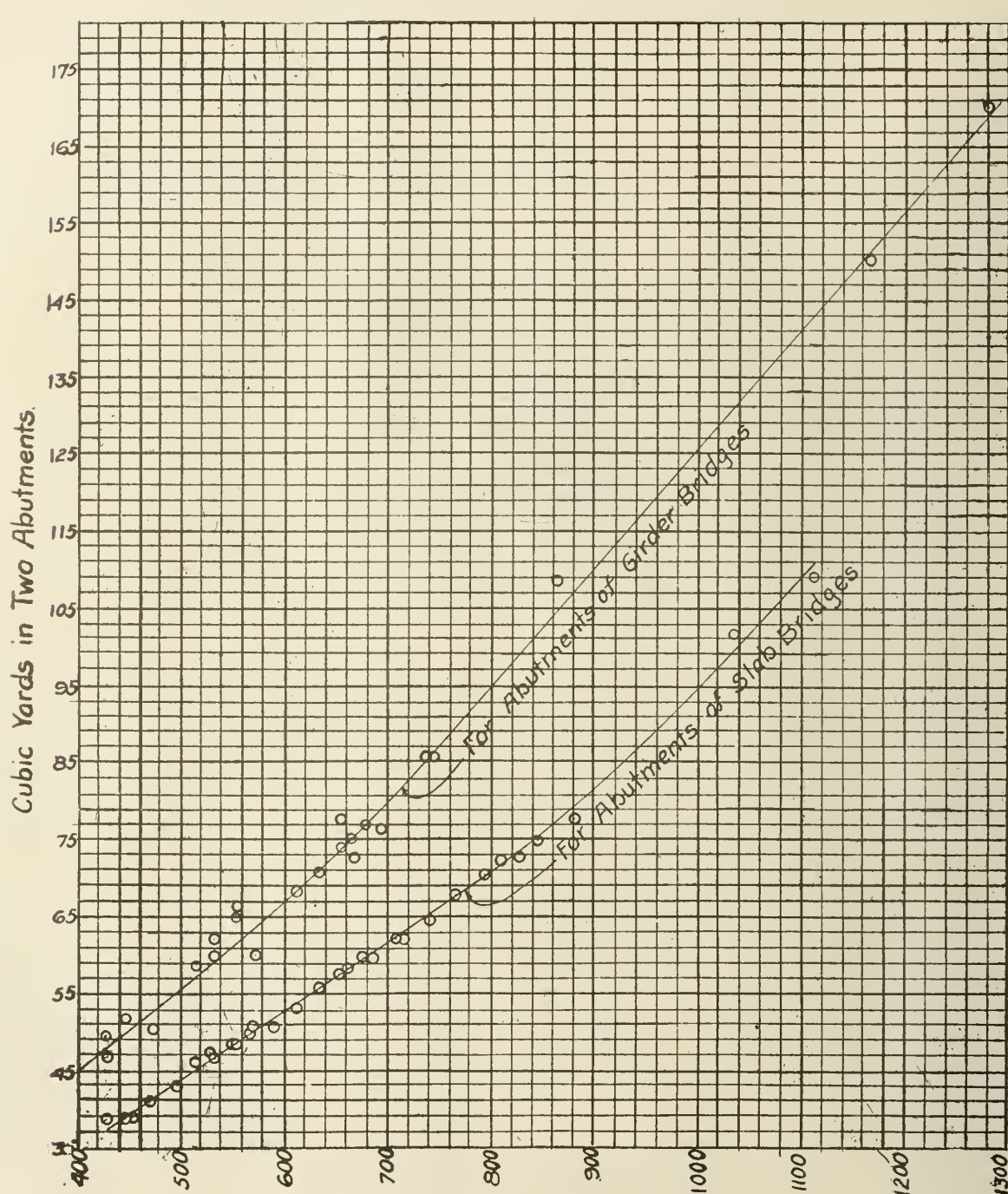


Fig. 1 Figures at Bottom Denote Values of H ($R + 2W$)

load of the cushion wearing surface, and a 24 ton engine live load. Excluding temperature stress, the steel is figured at 12,000 pounds per square inch; the compression in the concrete is assumed at 800 pounds per square inch.

For the reinforced abutments for girder bridges, the general type is the same as that for the slab bridges, with the exception that all abutment walls proper are 18" thick, and the width of base for the wings is 40 per cent of the total height. The extra thickness in abutments is for bearing of the girders. The extra width of base under the wings is for stability, as the wing walls are cut away from the abutment walls proper by a 1" partition to allow for expansion of the superstructure. They can, therefore,

receive no support from the abutments, as is the case with wings on slab bridges. The wings on this type of bridge also come up on the sides of the girders and drop several feet at the ends to follow the general side slopes on the road.

The reinforced concrete girder superstructures are designed with roadways from 16' to 30'. The roadway usually required is 16' to 20'. The side girders average from 4' to 6' in height, and 16" to 30" wide on the top. On the side girders there are heavy depressed panels to lighten the web and to give the proper appearance to the finished bridge. The floor slab and side girders on this type of bridge also extend to the back side of the abutment wall. The floor slab is designed to carry its own dead load, the cushion

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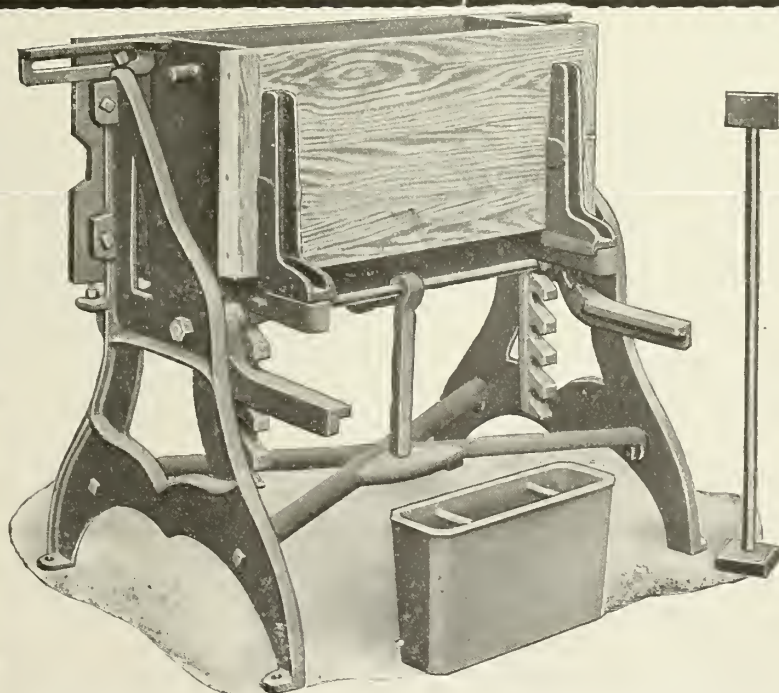
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wearing surface and a 24-ton engine live load. The side girders are designed to carry the entire dead load of the superstructure, plus a live load of 125 pounds per square foot on the roadway, or a 24-ton engine, whichever gives the greater moment.

Computing Yardage.

For the purpose of determining off-hand the approximate yardage in a pair of reinforced concrete abutments for either slab or girder bridges, Figure 1 has been prepared, and is applicable within the specific cases used. For abutments of slab bridges, 40 different designs were taken from the files of the Commission, and the number of cubic yards in the two abutments of each design was plotted against $H(R+2W)$. H is the distance from the finished roadway to bottom of footings, R is the clear roadway of the slab bridge, and W is the length of one wing measured on the stream side. R was taken as the clear roadway of the bridge, as this figure is always secured at the preliminary inspection of the bridge site. W , the length of the wing, can always be assumed in the field or computed in the office, knowing first the general conditions of the bridge site.

It will be noticed that the number of cubic yards in the two abutments varies approximately as the height of the abutments; also, that the maximum deviation from the curve does not exceed 2 cubic yards, and more often it is less than one cubic yard. In fact, for heights of abutments up to about 16', or where $H(R+2W)$ does not exceed 900, the quantities so plotted follow practically a straight line, and might be represented by the straight line formula, cubic yards = $.09 \times [H(R+2W)] - 1.37$, which oftentimes is convenient when the curve sheet is not at hand.

For a particular bridge, suppose the distance from the crown of finished roadway to bed of stream is 10', and the footing should be carried 4' below bed of stream. Then $H=14'$. Now assume the wings are each to be 13' 6" long, and that our finished bridge will have a 16' clear roadway. We have now $H(R+2W)=600$, the value to be read at the bottom of Figure I.

It will be seen by locating the point on the curve and going across to the left-hand side that there are about 53 cubic yards in the two abutments. Where the quantity at the bottom of the figure exceeds 900, we readily see that the curve begins to rise above the straight line. This is expected, as abutments exceeding 16' in height have the base of the wings spread to allow for the proper per cent of steel. This extra width of base is added to the back of the wing wall by a batter, the batter extending up from the footing 4' to 8', according to the height of the wall. This batter does not extend to the top of the wall, as the drop at the end of the wing would increase its thickness at the end, and this does not give the best appearance to the finished bridge. The abutment walls remain 12" thick up to 21' high, and from here on the thickness increases as the height increases. The slight variation from the curve in solving specific cases may be attributed to the difference in the angle of the wing with respect to the abutment, and the difference in width of footing for

bearing. The more nearly the direction of the wing approaches a parallel with the center line of the road, the higher will be the wing at the end, thereby increasing the number of cubic yards, but as the corner formed by the intersection of the abutment wall and wing is measured twice, these two quantities tend to compensate one another.

For the reinforced abutments on girder superstructures 25 designs were taken from the files of the Commission, and the number of cubic yards in the two abutments plotted against $H(R+2W)$, the notation being the same as before.

It is to be noted here that the number of cubic yards is somewhat greater than the number of yards in the abutments for slab bridges. This is due to the extra thickness of the abutment walls proper, to give the desired bearing and to the extra width of footings under the wings. It will be noted on this curve that some of the specific cases used had a wide variation from the mean. This can be attributed to the fact that some of the abutments had extremely long wings that were level on top and also the different length of spans requires a little different width of footing under abutments to take the required bearing. A curve of this kind could not take into account all of these conditions, and while several points fall several yards off of the curve, the mean is close enough for the purpose that it is to meet.

For a particular case, take the same dimensions that were considered before; clear roadway 16', height 14', and length of wings 13' 6". We now have 600 to read off at the bottom of Figure I. Getting the intersection with the curve for girder substructures, we find that the two abutments contain 67 cubic yards instead of 53 cubic yards in case of the slab substructure, a difference of 14 cubic yards in favor of the slab bridge. Figure I then is a ready means of comparing the substructures of the two types of concrete bridges and to determine the approximate number of cubic yards in each.

Cubic Yards in Superstructure.

The next thing of importance is to determine the number of cubic yards in the superstructures of the two types of bridges. For this, Figure II has been prepared, and is applicable for the flat top type of bridges up to 50' in span. For slab superstructures 48 designs of different roadways and spans were taken from the files of the Commission, and the total number of cubic yards in the superstructure was plotted against the clear span length, the curves drawn through the points having 16', 18' and 20' roadway. The three curves will meet the requirements of the majority of highway bridges. Occasionally a special case arises, such as a skew, or extra wide roadway, and then it is necessary to make special computations to determine the number of cubic yards. For a specific case, assume a bridge to have a 30' clear span and 16' roadway. We readily see the number of cubic yards to be about 43.2.

We may wish to consider for the same site the 30' girder type with 16' roadway. Here we see that the number of cubic yards is about 38.6, or a difference of 4.6 cubic yards in favor of the girder superstructure.

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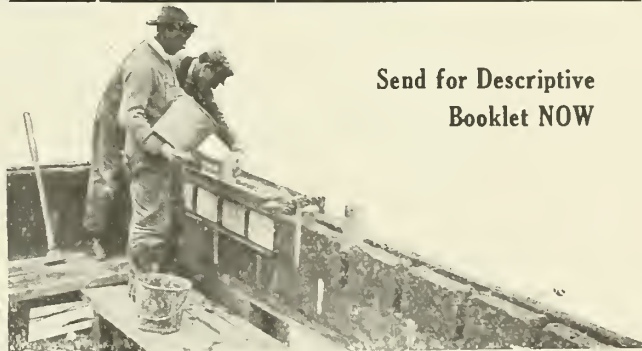
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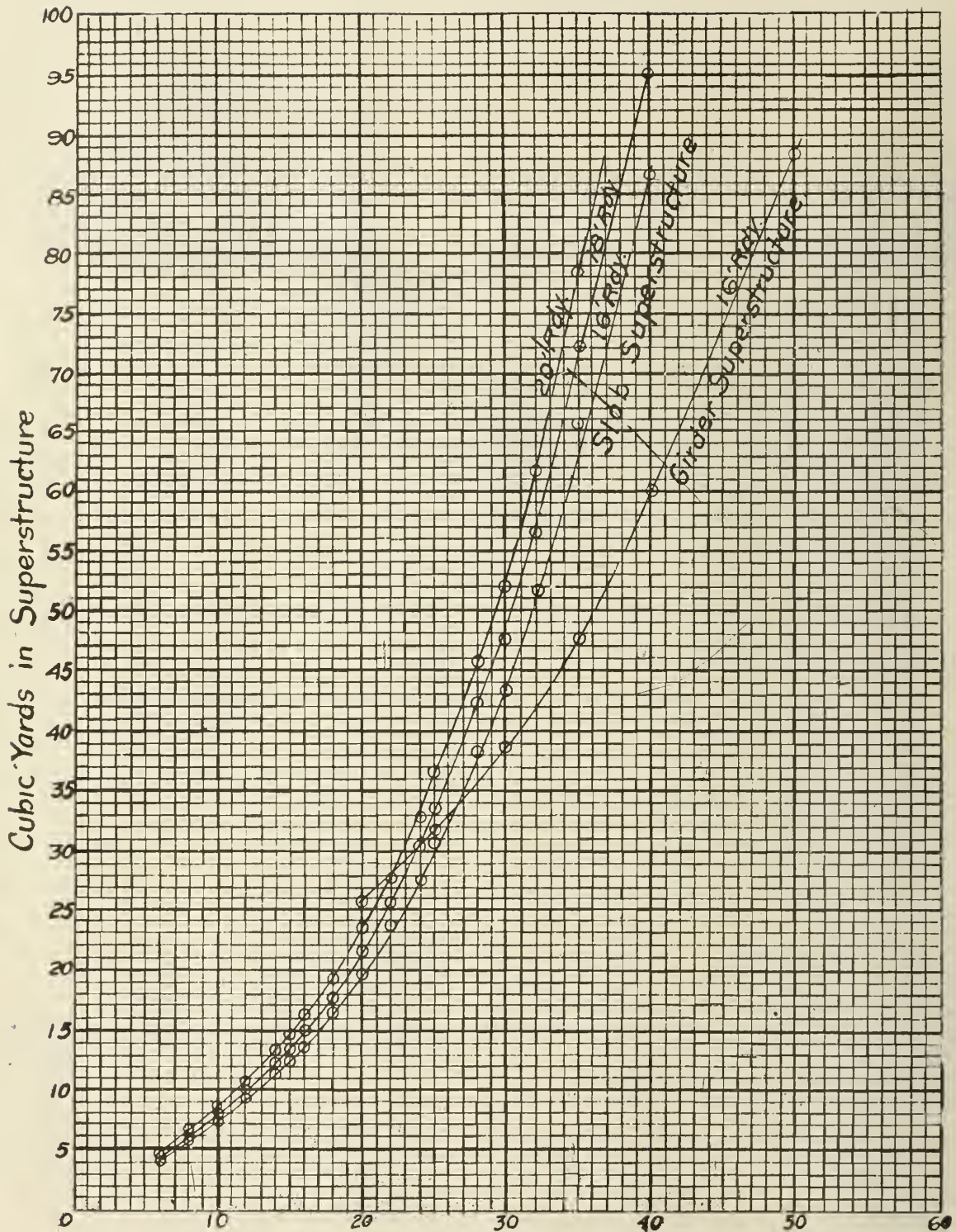


Fig. 2. Figures at Bottom Denote Clear Span

But you will notice for the same height substructure the difference in all cases is in favor of slab bridges. If it should happen that for a single span the girder bridge and the slab bridge should have the same yardage, an advantage still rests with the slab type, as it has been found that contractors usually bid more favorably on this type. There is also another very important point in favor of the slab type. If for any reason there should be any defective material placed in the rail, or poor alignment in its construction, it may

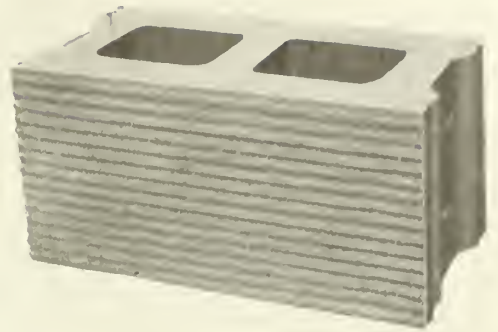
be torn down and replaced without disturbing the floor, even after the false work has been removed.

Having found the expression, that is, the measure of the number of cubic yards in the abutments and superstructures of concrete slab and girder bridges, the next step is to combine the quantities with a unit price that we may determine the approximate cost of each type. For this purpose Figure III has been prepared.

It has been found from the cost data of a large number of slab and girder type concrete bridges that have



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Architects are referred to Sweet's Index, pages 28 and 29.

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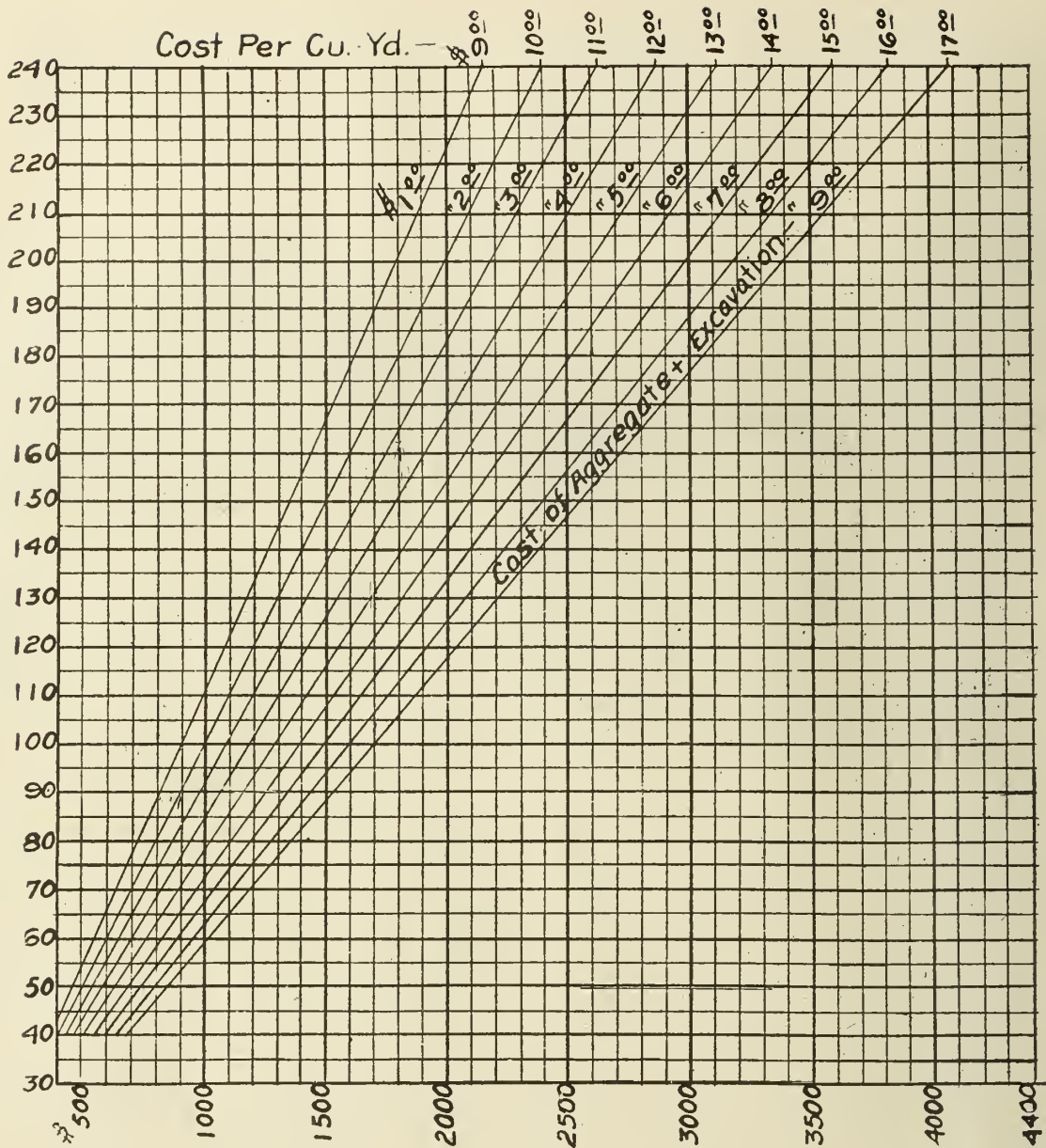


Fig. 3. Figures at Bottom Denote Total Cost of Bridge and Those at Side Total Cubic Yards in Bridge

been built under the supervision of the Illinois Highway Commission, that it is possible to get a very close figure on each individual item that goes to make up the cost of the bridge. First, the cost at the bridge site of sufficient cement to make one cubic yard of 1:2½:4 concrete. Second, the cost of the necessary lumber for forming one cubic yard. Third, the cost of reinforcing steel per cubic yard of concrete. Fourth, the labor cost in mixing and placing one cubic yard of concrete. Fifth, the cost of sufficient aggregate to make one cubic yard of concrete. Sixth, the cost per cubic yard of concrete to make the necessary excavation to start the concrete of the footings. The two items that largely control the cost of a structure of this kind are the excavation and the necessary aggregate for the concrete. We find that the cost per cubic yard of concrete for cement, forms, reinforcing steel, and the mixing and placing, have narrow limits of variation.

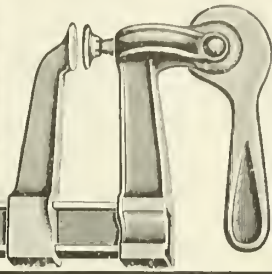
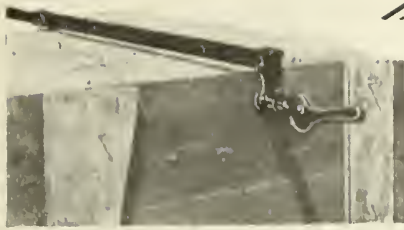
It, therefore, appears possible that some definite quantities may be fixed to the first four items and a

curve plotted for the last two, combining them in such a way that the total cost may be readily determined after we have learned the number of cubic yards in the bridge.

The cost at the bridge site of sufficient cement to make one cubic yard of concrete for a 1:2½:4 mixture may vary from \$1.75 to \$2.10. While the price of cement, the distance it has to be hauled, and the amount required for some aggregates, vary slightly, the extreme variation would not be over 20 cents per cubic yard from the average. From a general average of all cost data on this item, it would seem that we are probably safe in choosing for cement about \$1.90 per cubic yard of concrete.

The cost of forms includes all the necessary false work, bracing and form lumber for completing the bridge. While this item varies somewhat for different localities, and will vary again where the contractor can use some of his old lumber, it will fall between the limits of 75 cents and \$2.50. Experience has shown

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No matter whether you are erecting forms for a reinforced concrete sky-scraper or are building concrete steps in wood molds in your plant, the easiest, quickest and cheapest method of securing the forms in place is to use Colt's clamps. Wiring takes time and results in shaky forms. Nailing is expensive and injures the lumber. Clamps hold the forms rigidly in place, are quickly removed and leave the centering available for future use.

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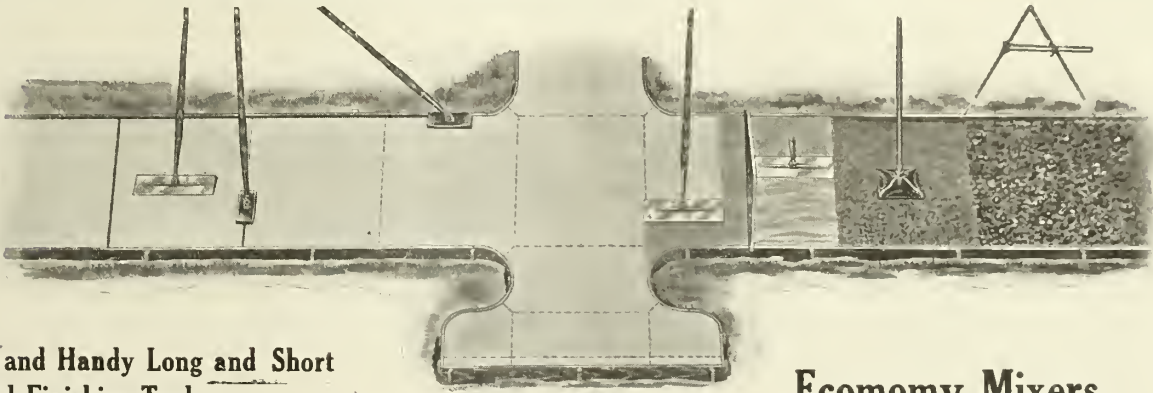
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EVERY TOOL and MACHINE Used to Build a Sidewalk.



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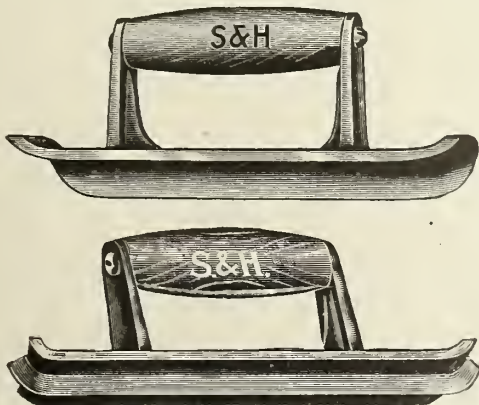
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that about \$1.50 for the ordinary type of bridge is usually sufficient and might well be chosen for this cost curve.

The reinforcing steel varies from 50 pounds per cubic yard for substructures to 170 pounds per cubic yard for superstructures, or an average of about 110 pounds for the two combined. This steel delivered at the bridge site under ordinary conditions and bent ready for placing in the structure will cost about \$2.10.

Cost of Mixing and Placing.

The item for mixing and placing concrete might vary from \$1.50 per cubic yard for crushed rock concrete mixed by hand to possibly as low as 40 cents for gravel concrete mixed by machinery. This item should also provide for the necessary work in spading the concrete next to the form and securing the desired finish. In spite of the possible wide variation, we find the cost of this item varies but little from the fixed amount of \$1.25. While all these quantities given above may seem somewhat in doubt as to their reliability, yet experience has determined that they are not far from the correct figures for normal conditions on the average bridge.

The item of excavation, which includes also cribbing, sheet piling, pumping, and all necessary work to start the concreting of the footings, has been found from the cost data on file to vary from 50 cents to \$5.00 per cubic yard of total concrete in the bridge. The 50 cents per cubic yard is found only in some very favorable cases, and on the smaller spans, for there is practically no cribbing, sheeting or pumping necessary. On the other hand, the cost of \$5.00 per cubic yard of concrete is caused by a soft, seepy soil where cribbing, sheet piling and excessive pumping are necessary. Quite often the wide variation in the item for excavation is due to poor management on the part of the foreman in charge. This item, therefore, may vary considerably, but with experience with the excavation that is to be handled and with the type of bridge that is to be built, one is able to estimate this item sufficiently close for all practical purposes.

It will be seen that the cost of the aggregate delivered to the bridge site is the second item determining the price per cubic yard of concrete. Under the most favorable conditions with respect to location of a satisfactory aggregate supply, it would likely cost at least 50 cents per cubic yard to haul it to the mixing plant. On the other hand, the cost of aggregate at the bridge site might exceed \$4.00 per cubic yard, as the structure may be isolated from a railroad station, and it may be necessary to ship in either gravel or crushed rock and sand, besides hauling it several miles into the country. In the light of the wide range on these two items, Figure III has been prepared to give the total cost of the bridge complete, including profit to the contractor under conditions where the cost of excavation, plus the cost of aggregate at the bridge site, might vary from \$1.00 to \$9.00.

For a specific case, we will assume that a concrete bridge has 120 cubic yards of concrete. We will next investigate the condition of the foundation, and assume the cost for completing this part of the work,

and express it as so much per cubic yard of concrete. We then approximate the cost of delivering at the bridge site the necessary aggregate to make one cubic yard of concrete. For convenience let us say that these two quantities amount to \$3.00 per cubic yard of concrete. Entering Figure III with 120 cubic yards at the left-hand side, and following this across to the \$3.00 curve, or the \$11.00 per cubic yard, which is the same thing, and then to the bottom of the figure, we find the cost of the bridge complete to be \$1300.00. The total cost per cubic yard of concrete is shown at the top for aid in determining the unit price.

From the figures heretofore given, we are able to determine approximately the number of cubic yards in either the slab or the through girder type of bridges, besides having a ready means of determining the probable cost. While the curves here developed apply only to the slab and through girder types of bridges, similar curves might readily be developed for the deck girder, the through girder floor beam type, or the arch, and would prove of equal service to the highway engineer, but their development is beyond the scope of this paper.

The foregoing is not intended to supply a substitute for engineering ability, but rather to furnish an aid that will safely direct the engineer who will interpret with judgment and experience.

Economy in Coal Pocket Construction.

There are three general types of coal pockets in use today, the all-timber, the all-concrete, and the combination type of concrete and timber. A great many of the latter design have been erected according to plans of Monks & Johnson, architects and engineers of Boston, Mass., who are able to reduce the cost of coal pockets considerably by using the forms for the reinforced concrete work in constructing a part of the wooden walls and bins of the coal pocket. The cost of all reinforced concrete coal pockets range from \$6 to \$7.50 per ton of capacity but in the combination type where the supports and the floors are of concrete but the walls are of timber the cost is generally about \$5.00 per ton of capacity, and this in no small part is due directly to the actual saving of the forms by incorporating them in the coal pocket itself.

Now we know what is wrong with concrete as a building material because Leonard Bronson, manager of the National Lumber Manufacturing Association, tells us. Says Mr. Bronson: "Who knows the relative final merits of concrete as a building material in respect to fire? It is known that concrete sewers are failures; concrete piling cannot begin to compare with thoroughly creosoted wood; for factory or warehouse floors concrete is not in it with hard wood or the stronger conifers; they have been thrown out of factories because they injured the health of the employes; concrete fence posts are heavy and brittle; who knows how long a concrete house will stand winds, rain and frost? The concrete wall greedily drinks the rain that beats against it." Mr. Bronson further says: "Wood is better for many uses," and we say that one of these uses to which wood is better adapted is the manufacture of matches.



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Embody the very latest ideas in the manufacture of Concrete Block and Brick.

It is the speediest and most versatile machinery ever devised for the manufacture of these products. It will make either equally well, or both at the same time without interference.

Capacity from 200 to 2,000 Block, or 10 times as many Brick per day.

It subjects the Wet Mix to a pressure of 50 tons applied from two sides at exactly the same time, and can be operated either by hand or power.

It is just the machinery for a small plant as well as a large one. One Press and one or more molds will give any output desired, and will reduce the Labor Cost from 40 to 60 per cent under the usual method of manufacturing these products, and will raise the quality very materially.

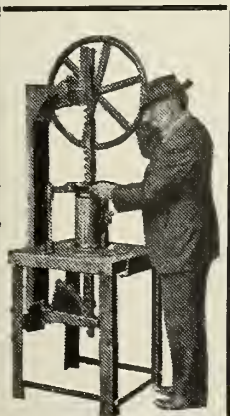
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Less Than \$100

You can buy a complete tile making outfit for less than \$100. That is a pretty low price, but you can do it. We can save you money and at the same time give you a better machine than any other on the market.

THE CARDIFF CEMENT TILE MACHINE



will make more tile for the money invested than any other machine. The same number of men will make more tile in a day with the Cardiff than any power machine can make.

You save the large investment, the wear and tear on machinery, and the power cost (steam, gasoline or electric).

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The Novo Engine Runs as Steady as a Clock

Runs with the least vibration, not only because it is of the vertical, four-cycle type, but because of other features exclusively Novo.

For running your mixers and other cement machinery a Novo gasoline engine is, therefore, especially adapted.

NOVO ENGINE

Novo Engines are simple to understand, start, and run. They give high efficiency and are so compact and light they are readily portable and take but a minimum of space. They are the lightest engines for power developed, are entirely self-contained and have a cooling system unaffected by cold weather. We guarantee the cylinders against cracking from frost. All working parts are enclosed away from dirt. Made in 1 to 10 H.P. and will deliver it.

Examine Novo Engines at the Cement Show

Chicago, Feb. 21st to 28th. Satisfy yourself then that they are, without question, the best engines for your work.

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Write for Details.

THE USE OF PORTLAND CEMENT IN FOREIGN COUNTRIES.

Most foreign countries have made no such progress in the use of Portland cement for a variety of building purposes as has the United States. United States consuls abroad in response to inquiries have written letters which contain many interesting statements and some which will suggest a foreign market for products made in this country. These letters* follow:

Germany.

(From Consul General Robert P. Skinner, Hamburg.)

In the city of Hamburg, the nature of the soil is such that, aside from the restrictions fixed by law upon the height of buildings, no very tall structures can be erected, and the number having as many as 10 floors is small indeed. Reinforced concrete is extensively used in large buildings, although in many cases the steel frames common to the United States, with a filling of sandstone and ornamental brick, are employed.

For centuries the ordinary clay brick has been the favorite building material of northern Germany. The most distinctive manifestation of old North German architecture takes the form of a heavy framework of timber filled in with well-backed brick, the timbers remaining visible. Structures of this kind have stood the test of time on soil often marshy and yielding, and in the country districts this style of building is still followed. It is altogether probable that these old timber-frame buildings in Germany are the prototype of the modern steel buildings. Clay brick is much cheaper than concrete.

In the case of small dwellings and apartment houses both ordinary clay and sand-lime brick are utilized. The manufacture of sand-lime brick has assumed large proportions in late years, there being more than 280 plants in operation. Hamburg firms now making them are satisfied with the business results and sell them at \$4.76 per thousand delivered on the ground. The walls of these brick structures are given a coat of Portland cement stucco, which is afterwards painted. The cement is put on from the top of the building downward, the scaffolding being removed with the completion of the work.

Ornamental work for reinforced concrete buildings is either made upon the premises by means of wooden molds or, as often happens, the decorative figures are carved by stonecutters from walls made sufficiently thick to admit of this treatment.

A prominent engineer of Hamburg reports that concrete block, introduced into Germany a few years ago, were unsatisfactory as they proved to be more expensive than brick, to which the German people are partial. It will be readily comprehended that when a building is intended to be covered with cement a much cheaper grade of brick can be used than would be employed in the ordinary American residence.

A brick is manufactured in this country from cement and slag, which is very light in weight but possesses sufficient sustaining power. It is used extensively for the interior walls of office buildings. Sometimes these

brick are made hollow to allow of their use as conduits for pipes and wires. They are offered today (Oct. 25, 1911) at \$7.14 per thousand, and an excellent quality of clay brick can be had for the same price, delivered on the building lot. In setting in partition walls, slabs of slag concrete 3' 6" long, 1' wide and 2" thick are used, these being tongued and grooved on the edges, so that the fresh cement which holds them together constitutes a solid sustaining rod both horizontally and perpendicularly. These slabs cost 54 cents per 1.2 square yards set in the wall.

There seems to be little chance of introducing American concrete molds and tamping machines, owing to the opposition to uniformity on the part of builders. One Hamburg firm manufactures a variety of concrete sills, water tables, caps, paving slabs, and cornice and arch stones, but in nearly all cases these are made according to designs of the architect. Special wooden molds are constructed and the pressing is accomplished by hydraulic machinery. Some years ago this firm attempted to market a concrete brick, but in order to compete with ordinary brick in price the product was necessarily of so inferior a quality as to be condemned by the building authorities and was given up. This was also the case in the manufacture of sewer pipe, which could not compete with ordinary clay pipe.

Reinforcing materials other than bar iron, which is most generally used, are covered by patents in Germany and are high in price. Quantities of these materials are exported, but as they are included among "Other goods manufactured of iron" in official statistics, there is no record of the amount shipped to foreign countries. Samples of American reinforcing materials were shown to a number of firms, which expressed the opinion that the designs might infringe upon German patents.

The popular German roofing materials are tile and slate. One engineer consulted suggested that a self-centering reinforcement of American production might be sold in Germany for the manufacture of light concrete roofs if not too costly. While the firms seen have given little encouragement to the American manufacturers of these materials, I am nevertheless inclined to believe that a thoroughly competent American agent on the ground might obtain some business, but attempts to accomplish the same result by correspondence would probably result in failure.

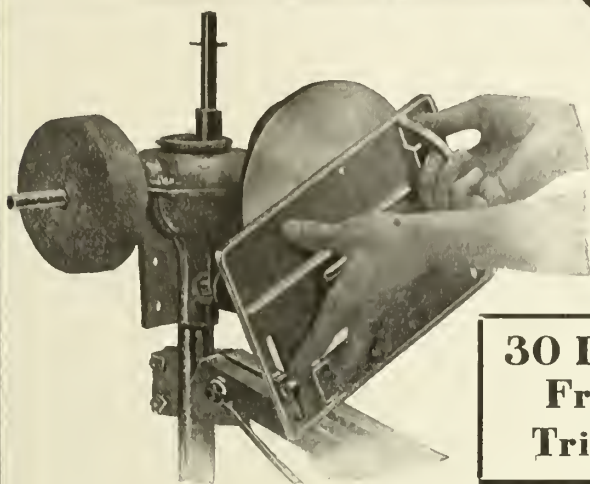
Hamburg builders of reinforced concrete structures work as rapidly, perhaps, as American builders after the foundations are completed, these latter in Hamburg consisting of piles driven closely together and covered with a thick floor of concrete. One local firm erected a fish market in Altona on a plot 20.10 by 37.04 meters (65.94 by 121.52 feet), three stories in height with an arched roof, in 60 days, the entire structure being made of reinforced concrete.

Italy.

(From Consul Frank Deedmeyer, Leghorn.)

In the immediate vicinity of Leghorn is found a cement rock of high value, the geological conditions corresponding with those found in the Boulogne-sur-Mer

*Daily Consular and Trade Reports, January 3, 1912.



**30 Days
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Polishes Concrete face plates

No promises! No red tape! No money needed!

You can try this all-metal, shaft-drive tool grinder, with its Dimo-Grit (artificial grit) wheels for 30 days absolutely free, and without putting yourself under any obligations. You can put all your tools in bright, shiny, keen condition, and you will be amazed how quickly and easily you can do it. You can sharpen your chisels, twist drills, draw knives, hatchets, augers—gum your saws and put a keen edge on every tool—all at no cost. You can find out how amazingly easy it is to keep face plates polished as smooth as plate glass. Use the outfit 30 days—then if you want to part with it, send it back at my expense.



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**Dimo-Grit cuts hardest steel as emery
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Dimo-Grit crystals are artificial diamonds—made of the same elements as real diamonds, fused in the terrific heat of the electrical furnaces at Niagara Falls. On the wheels of the Luther Hummer Grinder turning 4,000 revolutions per minute by foot power, Dimo-Grit peels steel off in tiny shavings, does not develop heat, no need of cooling with water, no danger of drawing temper. Dimo-Grit is the newest artificial diamond sharpening substance—the wheel for steel—leaving the smoothest, keenest edge. 25 times faster than grindstone, 10 times more efficient than emery. Carborundum wheels supplied when wanted.

Shaft-drive---foot and engine power

Mechanic's outfit consists of machine and 14 attachments—17 other attachments from which you can select what you want.

No other machine is like the Luther—it is all steel and iron—nothing to wear out—steel shaft drive like an automobile—ball bearings, dust-proof bearings. Costs no more than cheap chain-drive grinders. Runs as easy as a sewing machine. The 14 mechanic's attachments equip you for all kinds of sharpening, buffing and polishing. 5 years guarantee.

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We will send you 40 page free book showing all ways this outfit saves money. Then you can decide if you want to try it for 30 days absolutely free. Send back the coupon today. You will put yourself under no obligations. It is simply a request for full information. Tear out the coupon now and send it back today.

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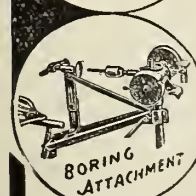
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Besides the sharpening attachments which are included in the sharpening outfits, there are 17 other attachments from which you can select what you want. In this way you can secure a forge, turning lathe, drill, circle saws, jig saws, metal polisher, etc.—17 in all—simply by getting these attachments to go on your Grinder.

If you were to purchase machines to do the same work that these attachments do, it would cost a good deal, but by getting these attachments for your grinder you can completely equip your workshop for amazingly small cost. Our Free Book describes all attachments.

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Ask your dealer for Dimo-Grit sharpening stones, the fastest and smoothest cutting sharpening stones in the market—look for the name "Dimo-Grit" on the stones.

quarries. The location of the quarries is about five miles from the city and the supply is practically inexhaustible. These quarries have been leased for a term of years by a corporation called Cementeria Italiana, with offices at Leghorn. This concern now manufactures annually about 60,000 metric tons (metric ton=2,204.6 pounds) of a high-class hydraulic cement of the Portland type. The cost of delivering the rock at the factory, including the royalty paid the owner of the quarries, is 55 cents per ton. The finished product is sold, f. o. b. Leghorn, at \$10.60 per metric ton. Most of this cement is used in Italy, although some is exported to Egypt and to Turkey. It is employed in the construction of submarine structures, buildings, floors, and sidewalks, and for tiling. The machinery in this local factory is chiefly of Italian make, but some was bought in Germany.

Russia.

(From Consul John H. Grout, Odessa.)

Since the beginning of 1911 there has been a revival of building operations not only in Odessa and other important centers of this consular district, but all over European Russia.

As regards construction work into which cement enters, it is more abundant than for a considerable period past. So extensive is it that Russian cement works are hardly able to supply the demand, and builders are turning to points outside of Russia for supplies. Taking advantage of this state of affairs, which is likely to continue for some time, it is alleged that the Russian cement manufacturers are seriously considering raising prices. According to information received by the Odessa Bourse, the cement factories located in southern Russia have formed a syndicate to be known as the Russian Cement Trading Co., which organization will have charge of and regulate all sales of cement. Any factory desiring to do an independent business will have to compete with the syndicate.

These facts have necessitated the consideration of means to prevent an advance in prices of cement, thus protecting the Russian buyer. The bourse committee of Novorossysk, being the nearest to the chief center of Russian cement production, has requested the various bourse committees of other cities of Russia to bring up for discussion the question of what measures ought to be taken to prevent increased prices of cement. It is expected that one recommendation to be adopted will be that of applying to the Minister of Finance, asking him temporarily to remit or diminish duties upon foreign cement.

This consulate has been informed that, owing to the superior quality of certain grades of Russian cement, many contracts for its exportation are in force. These contracts have to be filled, and we thus have the condition presented that, while home demands for cement are pressing, engagements require its exportation to a certain extent. This, of course, reduces the home supply.

As regards building materials, the usual dimensions for brick here are 7"x3½"x1¼". The price of the common variety of these brick is \$9.27 per 1,000. A

somewhat larger size brings \$12.36 per 1,000, while a superior grade costs \$15.45. Good tiles from Marseille cost \$28.33 per 1,000, while a common variety locally made brings \$3.60 to \$6.18.

Lime costs, according to quality, \$7 to \$14 per ton, and the descriptions and kinds are widely different. Portland cement imported from England sells in Odessa for \$17 to \$21.50 per ton. There are several more or less similar kinds of cement produced in south Russia, costing at the points of their production about 50 per cent less. Some of them are good, but are said to require careful selection.

The daily wages of common unskilled laborers range, according to supply and demand, from 35 to 70 cents per day. Bricklayers earn during the season as much as \$1.25 per day, but out of the building season have to accept 75 cents per day, and sometimes less. The price of coarse sand can not be well defined. There are places where it can be had for little more than the cost of digging, while at others it may cost \$1 or higher per ton. The cost of firewood has to be reckoned according to locality, season, and quality, ranging from \$5 to \$8, or even more, per ton. Prices for coal are about the same. Cement bricks and tiles have been experimented with in this district, but have not given universal satisfaction.

Reverting again to the scarcity of cement of local production as compared with the demand for this material, information in this office is to the effect that there is in process of construction by the Russian Government at Cronstadt a graving dock that, when finished, will probably be the largest of its kind in the world. The amount of cement needed for this dock alone will be enormous and impossible to supply from Russian factories.

Austria.

(From Consul Joseph I. Brittain, Prague, Bohemia.)

An investigation of trade conditions points to the advisability of American manufacturers of concrete mixers making a practical effort to get in communication with some of the leading Prague dealers in these machines. The effort will not cost much and may produce good results.

There has been a large amount of concrete work done in and about Prague within the past few years,

We are the sole agents in United States, Canada and Mexico for

Meyers's German Cement and Liquid

FOR PATCHING ALL KINDS OF CEMENT WORK

We have a large stock on hand. Prices as follows:

1 Kilo Can.....	\$1.50
2 Kilo Can.....	2.75
4 Kilo Can.....	5.00
Barrel powder, 50 Kilos, per kilo.....	.80
Demijohn liquid, 68 Kilos, per kilo.....	.80

All prices f. o. b. New York City.

We also handle Dugan's Invisible Patcher for patching all kinds of Limestone and Bluestone. St. James Bldg., Broadway and Twenty-sixth St.,

MICHAEL COHEN & CO.
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such as building locks, dams, retaining walls, and various structures having in part concrete construction. Where extensive work is being conducted the mixers are operated by electricity, but where the contract is small they are manipulated by hand. Much of the mixing is also done by hand without the use of any machines, as labor is poorly paid here, and usually there is more labor than employment. Machinists are paid 10 to 12 cents per hour, with 12 hours' work; carpenters 12 cents an hour, with 10 hours' work; masons 12 cents an hour; ordinary laborers from 40 to 65 cents a day. Women are largely employed by masons and plasterers in the construction of buildings. These women usually mix the mortar, sift the sand, and carry mortar and frequently brick to the masons. The concrete mixers mostly in use here are imported from Germany.

PROGRAM N. A. C. U. CONVENTION.

(Continued from page 30)

men of national reputation, and the occasion will undoubtedly be as enjoyable as the first.

Many of the state highway associations, and those interested in good roads, are arranging to hold joint sessions, at which concrete roads, highway bridges and drainage will be subjects for consideration. It is no exaggeration to say that the number and character of the papers and reports will exceed the high-water mark of last year. From present indications the attendance will also far exceed that at the New York convention.

Papers of vital interest to designing engineers will come up for consideration, and a number of important specifications will be adopted. No one should fail to attend this convention if it is possible to do so.

IOWA ASSOCIATION HOLDS SUCCESSFUL CONVENTION AND SHOW.

The convention and show of the Iowa Association of Cement Users was held at Sioux City, Iowa, January 10-12, and was a success not only in attendance but in the matter of discussions at the convention and exhibits at the show. Mayor A. A. Smith of Sioux City gave the address of welcome, which was responded to by H. H. Dean of Payne, Iowa. Some of the papers were as follows:

"The Use of Cement Drain Tile in Iowa," Chas. E. Sims, Mgr. Concrete Tile Co., Worthington, Minn.; "Failures of Drain Tile in Iowa and Their Prevention" (illustrated), Prof. A. Marston, Iowa State College; "Washing of Sand and Gravel for the Market," S. H. Brown, Pres. Hawarden & Lake View Sand & Gravel Co., Lake View, Ia.; "Cement Silo Construction" (illustrated), M. L. King, Experimentalist in Agricultural Engineering, Ames, Iowa; "Cement and Concrete: Their Architectural Expression," W. L. Steele, Architect, Sioux City, Ia.; "Construction of Cement Plaster Houses," P. P. Comoli, Sioux City, Ia.; "Recent Types of Concrete Bridge and Culvert Construction" (illustrated), T. H. MacDonald, Engineer Highway Commission,

Ames, Ia.; "The Requisites of Good Concrete," Geo. P. Dieckmann, Chemist Northwestern States Portland Cement Co., Mason City, Ia.; "Concrete Paving: Surfaces and Expansion Joints," K. C. Gaynor, City Engineer, Sioux City, Ia.; "Concrete Paving as Constructed in Mason City," F. P. Wilson, City Engineer, Mason City, Ia.

F. P. Wilson, City Engineer of Mason City, Iowa, was elected president, and Ira A. Williams, Ames, Iowa, remains in the office of secretary.

PRELIMINARY ESTIMATE OF PORTLAND CEMENT PRODUCTION IN 1911.

Complete statistics for the year 1911 were received by the United States Geological Survey during the month of January from about 70% of the Portland Cement manufacturers in the United States. Based on these returns an estimate has been made by Ernest F. Burchard of the U. S. Geological Survey of the entire output for the year. It is believed that this estimate is within 2% of the exact quantity of Portland Cement manufactured in 1911. There was apparently a slight increase in the production of 1911 over that of 1910, amounting to about 1,300,000 barrels, approximately 77,877,236 barrels having been made in 1911 as compared with 76,549,951 barrels in 1910. This represents an increase of only 1.7% as compared with the increase of 17.7% that occurred in 1910 over the previous year. The figures for 1910 and 1911 are so close that when complete returns are received possibly a slight decrease in production may be shown. The average factory price per barrel not including packages was 86.7 cents in 1911 as compared with 89.1 cents in 1910, a decrease of 2.4 cents per barrel or 2.68%. In place of the five geographic districts formerly considered by the Survey, the United States has been divided into 11 subdivisions based on the grouping of plants in direct relation to the trade territory covered by each group. This grouping is also more logical when the raw materials are considered. For instance the plants in northeastern Indiana using marl are grouped with the Michigan plants, many of which use marl, and the plants in southern Indiana and northern Kentucky, all of which are near Ohio river, and all of which use hard limestone, are grouped together. Plants near Chicago, whether in Illinois or Indiana, are logically grouped together because of their nearly equal freight rates. The Southeastern States, in which plants use mostly Appalachian limestone, are grouped together, and Texas has been transferred to the group of Great Plains States, with which it more logically belongs. Plants between Missouri river and Mississippi river in Missouri and Iowa are grouped together, and the plants in the Rocky Mountain States are considered in a separate group.

An attempt has been made to estimate the shipments of cement by districts for 1910 and 1911, but with regard to such statistics there are fewer data and the figures are not regarded so nearly accurate as those of production. 1911 was the first year in

which inquiries have been made by the Survey with regard to stocks on hand. According to returns received there were decreases in production in the following districts: Lehigh, Kentucky and Southern Indiana and in the Great Plains and Mountain States. The increases recorded were in New York, Ohio and western Pennsylvania, Michigan and northeastern Indiana, Illinois and northwestern Indiana, the Southeastern States, Iowa and Missouri, and in the Pacific Coast States. Slightly better prices were realized in the Lehigh District, New York, and on the Pacific Coast, but in Michigan and northeastern Indiana, Illinois and northwestern Indiana, and in the Great Plains and Mountain States

the average price was lower than in 1910, but in western Pennsylvania and Ohio, southern Indiana and Kentucky, the Southeastern States, and in Iowa and Missouri the price remained about the same.

The apparent increase in average price per barrel in the Lehigh district and New York is due to the fact that many producers' reports took no account of the increase of 8c per barrel allowed consumers for return of sacks in 1911. Considering this difference in allowance for bags the average price for the Lehigh and New York districts shows an actual decrease instead of a gain.

For the sake of ready reference these statistics are arranged in tabular form:

STATISTICS OF PORTLAND CEMENT INDUSTRY, 1910 AND 1911.

STATES	Active Plants			Production and Shipments		Change per cent	Average factory price per barrel	
	'10	'11		1910	1911		1910	1911
Eastern Pennsylvania and New Jersey (Lehigh District)	24	23	Prod. Ship.	26,315,359 27,033,313	25,924,516 25,634,671	— 1.5 — 5.2	\$.729	\$.763
New York	8	7	Prod. Ship.	3,296,350 3,059,539	3,314,217 3,058,463	+ .5 — .04	.808	.841
Ohio and Western Pennsylvania	9	9	Prod. Ship.	6,072,987 5,615,662	6,675,249 6,553,895	+ 9.9 +16.7	.775	.770
Michigan and Northeastern Indiana	14	12	Prod. Ship.	4,524,591 4,508,738	4,570,033 4,436,463	+ 1.0 — 1.6	.870	.849
Kentucky and Southern Indiana	3	3	Prod. Ship.	2,824,832 3,016,413	2,818,82 2,738,630	— .2 — 9.2	.799	.802
Illinois and Northwestern Indiana	6	6	Prod. Ship.	8,376,450 8,151,294	8,617,341 8,537,442	+ 2.9 + 4.7	.940	.836
Southeastern States, (Maryland, Virginia, West Virginia, Tennessee, Georgia and Alabama)	8	10	Prod. Ship.	3,071,009 2,800,563	4,005,001 3,723,183	+30.4 +32.9	.793	.81
Iowa and Missouri	6	7	Prod. Ship.	5,722,971 5,261,160	6,060,261 6,008,503	+ 5.9 +14.2	.916	.911
Great Plains States (Kansas, Oklahoma and Central Texas)	16	16	Prod. Ship.	7,723,253 7,087,296	6,904,468 6,743,060	—10.6 — 4.8	.996	.871
Mountain States (Colorado, Utah, Montana, Arizona and Western Texas)	8	7	Prod. Ship.	2,236,561 2,065,393	2,117,930 1,974,476	— 5.3 — 4.4	1.288	1.156
Pacific Coast (California and Washington)	9	11	Prod. Ship.	6,385,588 5,941,340	6,869,400 6,523,106	+ 7.6 + 9.8	1.354	1.407
Totals	111	111	Prod. Ship.	76,549,951 74,540,711	77,877,236 75,931,891	+ 1.7 + 1.9	.891	.867

Interstate Tile Men Meet.

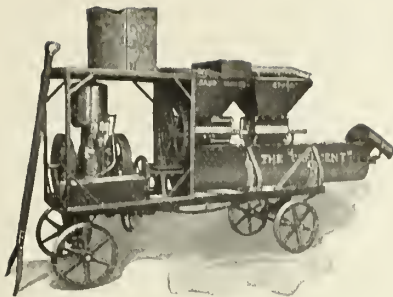
The seventh annual convention of the Interstate Cement Tile Manufacturers' Association will be held in Chicago, Feb. 21-23. This is at the time of the Chicago Cement Show, so the members of the association may have an opportunity to kill two birds with one stone. Many interesting papers are promised for the convention, not only on the manufacture and use of concrete tile but on allied subjects, which will be of interest to many cement products manufacturers.

Larger Quarters Became Necessary.

The Hydro-Bar Waterproofing Co., waterproofing engineers and contractors, formerly with offices at 32 West Thirty-third Street, New York City, has removed its offices and factory to its own building at 519 West Nineteenth Street. An increased demand for the company's products, Lapadas, Soloto and McCoy's Elastic Cement, is reported, which made it necessary that greater facilities be afforded for manufacturing.

CONCRETE will have booth 32 at the Chicago Cement Show, February 21-28. Come and see us.

Have you copies of the August, October and November, 1911, issues of CONCRETE? We are willing to pay 25c each for a limited number of these magazines. We need them to complete our files. We are willing to pay 15c each for a few copies of the issues of CONCRETE as follows: January, February, March, May and July, 1911, providing the magazines are in good condition. Address Concrete Publishing Co., Detroit, Mich.



Showing Mixer With Stone Hopper

How Your Neighbor Makes Money

YOU profit by the experience of others, or, in other words, we profit by the experience of *each other*. For instance—if John Jones is putting money in the bank by making cement tile and brick, don't you stand the same chance? And if Sam Brown is cleaning up a bunch of money by using an up-to-the-minute mixer, what's keeping you from doing the same thing? Take an inventory of yourself, and then let us tell you how John Jones and Sam Brown are doing it with

"Crescent" Continuous Concrete Mixers—The simplest, strongest, most practical and handy mixers on the market. Proportions wet and dry materials accurately, and mixes thoroughly. The price is low. Every cement worker should have one. We guarantee it.

"Crescent" Sewer Pipe and Tile Molds—Used the world over, and by Uncle Sam in his reclamation work. All sizes 4" to 48". Bell-up or bell-down on same mold, with or without pallets. We employ over 500 patterns in making pipe and tile molds alone. We can explain every "in and out" of this business.

"Crescent" Vertical Tamping Brick Machines—The only practical and scientifically correct machine on the market. Our 1912 model has a big feature that revolutionizes brick machines—the combined hopper, stripper and finisher, combined and patent facing plate. You will want it if you see it.

"Crescent" Power Tile Machines—To make tile 3" to 10". The price is very low. This machine alone is a big profit producer. Can be operated by one man. Utmost strength. Exclusive features.



"Crescent" Sewer Pipe Mold

We Will Exhibit at

Chicago Show, Feb. 21 to 28, Booth 138-139
Kansas City Show, Mar. 14-21, Booth 70

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☐ Mixers ☐ Tile Molds ☐ Brick Machine ☐ Power Tile Machine

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Proof That NATIONAL MIXERS Make Good

R. T. Ford Co., General Contractors,
Purchased a National Mixer in 1907
Purchased another National Mixer in 1909,
Purchased another National Mixer in 1911,
Using all of them on New York State work.

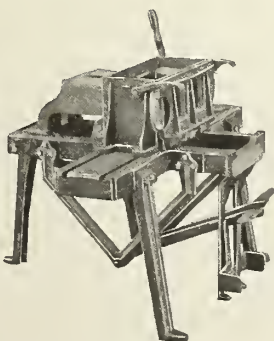
Send for Catalogue C.
NATIONAL MIXER CO.,
641 Mercantile Bldg., Rochester, N. Y.



"World Beater" Block Machine

Fast, positive, accurate. Mold box and cores controlled by foot levers. Makes solid or hollow blocks, water-table, column, silo and porch blocks. Pallets cast with handles—no carriers needed. Write for new catalog.

U.S. Gas Machine Co.
Muskegon, Michigan



The largest advertisement I ever ordered appears on pages 151, 152, 153 and 154. It will pay you to read it.

HERMAN BESSER.

At the Chicago Cement Show

have your mail addressed to you
Care "Concrete" Booth 32

Cement Show, Coliseum - Chicago, Ill.

New Equipment, Methods and Materials

In this department the Editors endeavor to keep our subscribers informed upon new tools, methods, machines and materials used in this industry. It is in no sense a department for the benefit of advertisers. To secure attention the thing described must be new to our readers. No matter will be printed simply because an advertiser desires it. Likewise, no matter will be excluded simply because the article described is not advertised in this paper. We aim to keep our readers informed—suggestions for the improvement of this department are solicited.

Concrète Mixed in Transit.

Capt. F. T. Arnold, U. S. A., New London, Conn., has been watching concrete construction on government work long enough to work out the following proposition: Money is saved if the contractor can eliminate useless and wasteful handling of materials. Capt. Arnold has placed upon the market a concrete mixer which will interest contractors generally and especially those who would like to dump their concrete right into the forms from the mixer. The Arnold mixer consists of a mixing drum mounted like a steel cart. The axle turns in bearings in the handle and inside the drum are mounted a number of mixing blades. The drum is so shaped as to throw the material from side to side six times and turn it over twice during each revolution.

The drum may be charged at the material pile and the concrete is thoroughly mixed while the mixer is being wheeled fifty feet. It mixes mortar equally well.

The drum will mix a batch of 2.7 cu. ft. and deposit it, in three minutes. Contractors who are using the Arnold mixer assert that by mixing and depositing the concrete at one operation, much time and labor are saved, and such equipment as carts and barrows is eliminated. On extensive work, three mixers may be worked to advantage in a gang. The machines are built of high grade steel and weigh 400 lbs. each.

Marble Lumber.

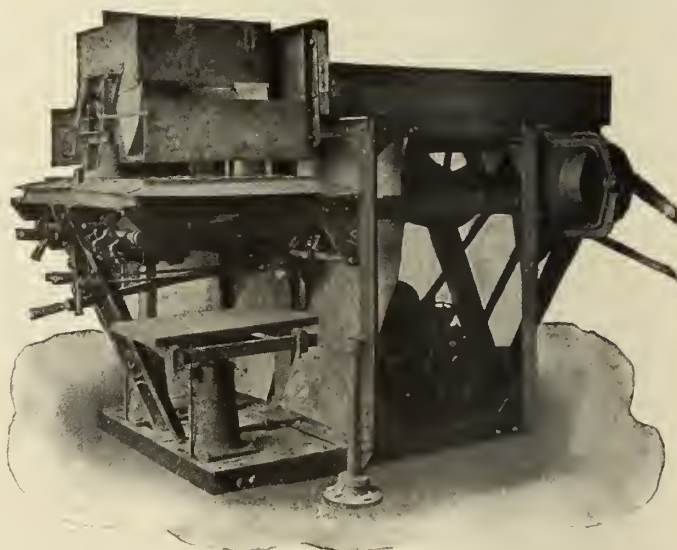
We believe that one of the most versatile men in the concrete products business is Amos Stouffer, superintendent of the Art Stone Co., Waynesboro, Pa. Mr. Stouffer is getting along in years. He has spent two decades experimenting with concrete. He has worked out a number of formulas and has patented many processes for the manipulation and application of concrete in many small ways. He knows how to use glue molds, he manufactures a lawn roller mold and has a special process for making concrete blackboards.

One of his latest products is "marble lumber." By a process all his own he makes an artificial marble in solid colors or streaked to represent any known variety of natural marble. He sells his formulas to concrete products manufacturers and contractors who want to manufacture the products for sale or for their own use. His marble lumber may be made as soft as hard wood for interior finish, or harder than natural stone for outside trim. It may

be sawed or nailed. Some of his thousand designs were on exhibit at the New York Cement Show and will be shown at the Chicago show this month. The marble is cast in inexpensive molds, to form material for mantels, fireplaces, show-cases, bath room fixtures, wainscoting, floors, etc. Several concrete plants operating under Mr. Stouffer's direction have created a good demand for marble table tops. There seems to be a wide range of use for marble lumber and its manufacture looks like an attractive side line for general concrete plants.

New Idea in Block Making.

Almost all machines and molds for making concrete building blocks have depended upon one or the other of two methods of securing a dense block. The concrete has been compacted by tamping or by



Cockburn Block Machine

pressure. We believe one of the first machines used in forming concrete by any other method was the D. & A. post mold by which the inventor shook the filled mold until the wet mixture of concrete became a dense mass.

Now we learn of a concrete block machine making use of this principle. We illustrate here a machine which has just been introduced, although it has been in constant use in a demonstrating plant in Newark, N. J., for over a year. The machine makes a cored block of unusual density. The concrete is fed into the mold from the material hopper

above. The mold, actuated by a special mechanism, is in constant motion. The concrete, in very wet form, is jarred into place and is shaken until every void is filled. Then the surplus is scraped off, the cores withdrawn and the mold released. The action of releasing the mold automatically trowels the sides of the block.

The machine was exhibited for the first time publicly at the New York Cement Show by the Cockburn Co., 12th and Monmouth Sts., Jersey City, N. J. It is claimed that the machine, in the hands of the average operator, will turn out a block a minute throughout the day. The inventor claims that by the shaking process, the water is forced up through the concrete, reaching every particle of cement in the concrete, thus insuring perfect crystalization and dense, strong block. A more extended description of the action of this machine will appear in this column later.

German Machine Shop Equipment.

Through its American managers, the Wiener Machinery Co., Dey and Church Sts., New York City, a German firm, the Oeking Co., Duesseldorf, Germany, is introducing a number of solid steel frame punching and shearing machines for the use of manufacturers of concrete mixers, block machines and metal forms. The German company also manufactures of number of types of machines in which a variety of metal working tools is contained in one frame. These are specially designed for contractors who have occasion to fabricate steel on the job.

New Idea in Block Construction.

Much has been written about methods to prevent dampness in concrete block walls. Of course if all concrete were properly proportioned, mixed and placed, the difficulty would be solved, but unfortunately builders and block makers don't always achieve the distinction of doing work that way and manufacturers of block making equipment have advised various methods to be used to insure dry walls in spite of indifferent workmanship.

One common method is to make the face of the block of rich mixture, tamping in the coarser concrete for the body of the block. This is effective when a good bond is secured between the two mixtures. George F. Simmons, Winnebago, Neb., manufactures a block machine which produces a building block in two sections. The two-piece type of wall is laid, with no connection between the two parts except metal ties. Mr. Simmons suggests that the outer section of each block be made of a richer, more dense mixture than the inner section. He points out that this overcomes the tendency of rich facing to chip off from faced block.

Moderate Priced Block Machine.

William Cobb has been in the foundry business in Jackson, Mich., for several years. He has manufactured many castings for concrete machines of all kinds and has now put out a block machine of his own which has several new features.

The leading type of this machine will make hollow blocks 16", 20" and 24" long. The widths run

(Continued on page 96)

"Concrete Sidewalks"

Seventh Edition

Every concrete contractor should have a copy of this book—64 pages, 5 in. x 8 in., printed in good, clear type. It is full of valuable information about the construction of concrete sidewalks, pavements, curbs and gutters.

Price 35c

Some of the Things to be Found in This New Book

Standard Specifications for Concrete Sidewalks.
How to Provide for Expansion Joints.
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from 8" to 12". Solid blocks may be made in the same lengths, with widths from 4" to 6". All sizes of block are made on the same pallet and changing the machine from one size to another simply involves changing the end doors of the mold box and altering the mold's position on the frame. The machine has no small bolts in it and changes are made with unusual ease.

Mr. Cobb makes no extravagant claims for his machine. He states that he simply wants to fill a growing demand for a low cost block machine that will turn out good block in the sizes and styles most demanded by builders. Mr. Cobb's block machine factory and foundry are located at 209 Clinton St., Jackson, Mich. Other products of the plant are cast iron man-hole covers.

New Systematic Mixers.

The growing popularity of continuous mixers has led several machinery manufacturers to bring out special types for use in block, brick and tile plants. One of the latest is the "Systematic Jr.," just placed on the market by the Cement Machinery Co., Jackson, Mich. This machine has a smaller capacity than the other mixers made by this firm and in many respects has features especially adapted for work in a stationary plant.

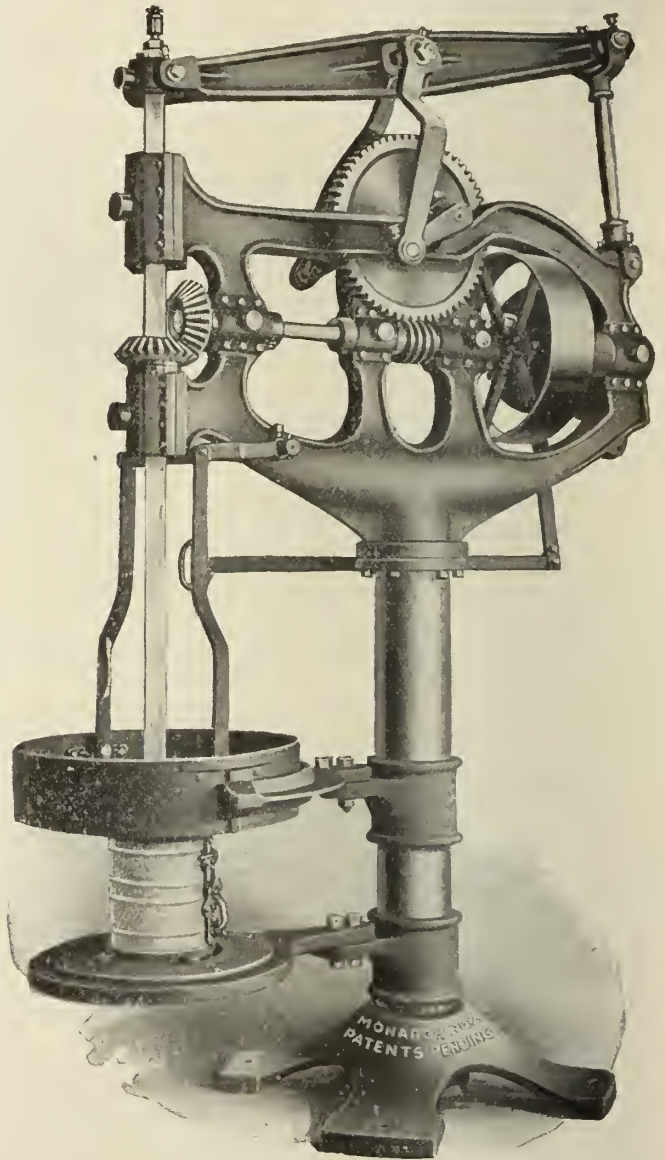
Another new type is a 70-yard machine which is claimed to have a capacity of 70 yards per ten-hour day when the stone hopper is not used. When this hopper is used the rated capacity is much larger. Both of these new models are the product of the company's new factory, 420-424 N. Mechanic St., Jackson, Mich.

Concrete Tile Machine with Novel Features.

A machine of novel type, for the manufacture of concrete tile, is made by the Monarch Mfg. Co., Ottumwa, Ia. It sets solidly on the ground with a heavy base to insure stability. The designers have paid especial attention to securing rigid construction, and rigid position of operating parts. The hopper is so attached to the machine as to be practically stationary, and moves only high enough to permit the removal of the completed tile from the pallet. The hopper is connected to the main column of the machine by means of an adjustable collar, which, either independently or in conjunction with the lower pallet holder, may be raised or lowered for different sizes of tile.

The frame, or head, is one solid cast unit, and the packer shaft has been made to keep its alignment under all conditions of service. The driving shaft, actuating the packer shaft, is fastened to the frame

with four large bearings and the driving mechanism operates through specially cut steel gears, carried by large annular ball bearings. The stroke of the packer shaft, which may be adjusted from 20" to 34", is controlled by a walking-beam, another solid cast unit. This walking-beam is driven from both



Monarch Tile Machine

sides of a worm wheel and gear, in such a manner that it cannot get out of alignment and bind the packer shaft.

Accessibility of moving mechanism and ease of assembling and dismantling have been given particular attention by the designers. An auxiliary shaft, used in connection with the packer shaft

(Continued on page 98)

SAMSON SPOT SASH CORD



Made of extra quality stock, carefully inspected, and guaranteed free from all imperfections of braid or finish. Proved by both tests and long experience to outwear common cord or metallic devices many times over. Can be distinguished at a glance by our trademark, the Spots on the Cord. Send for catalogue and samples.

Trade Mark Reg. U. S. Pat. Off.

Samson Cordage Works, Boston, Mass.

Patek's Concretcote

Patek's Wall Concretcote

A DAMP-PROOF FINISH FOR CONCRETE, BRICK AND STUCCO WALLS.

Patek's Wall Concretcote makes cement walls impervious to moisture of any kind and preserves and decorates the surface. It presents a most desirable effect and will outwear any similar paint made. It gives a uniform appearance to concrete surfaces, covering spots, dirt streaks, etc., and does not peel, scale, check or discolor. It overcomes saltpetre troubles and resists alkali found in cement blocks. On walls of open courts it acts as a light reflector. Prevents damp sweating walls in breweries, laundries, dairies, cooling rooms, etc. Comes in white and six tints.

Test Quantity FREE. To give you an adequate idea of the superiority of Patek's Wall Concretcote as a finish for cement surfaces, we will furnish you with a sufficient quantity to thoroughly test its merits. Write for free offer and descriptive booklet showing colors.

PATEK BROTHERS

Sole Makers
MILWAUKEE, - WIS.

Patek's Floor Concretcote

A DUST-PROOF AND DAMP-PROOF FINISH FOR CEMENT FLOORS.

Patek's Floor Concretcote forms a protective coating for cement floors. It penetrates the concrete deeply, and evenly, fills and seals the pores and produces a smooth, elastic linoleum-like surface that is absolutely moisture-proof.

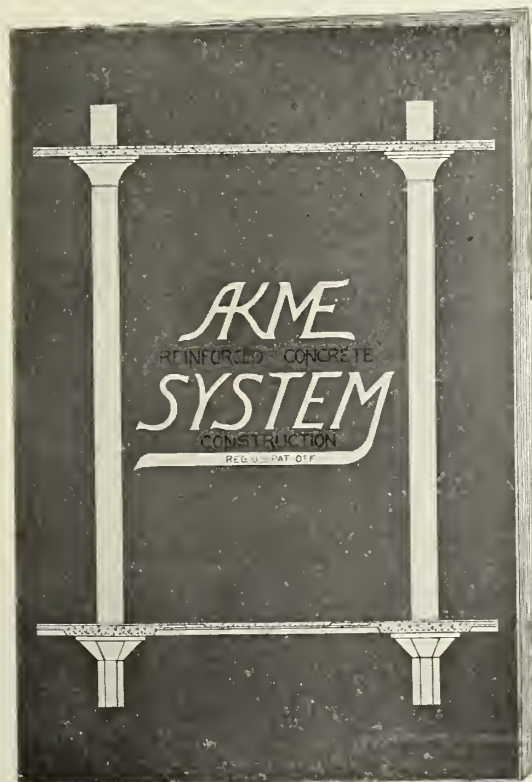
It prevents the pulverizing and dusting of the cement caused by heavy traffic making it the best floor finish to use on cement floors of mills and factories where machinery is running or merchandise exposed.

Patek's Floor Concretcote makes cement floors absolutely dust-proof, damp-proof and impervious to greases, water, oils, etc. It will not chip off, break or peel.

Test Quantity FREE. So you can prove to yourself the remarkable efficiency of this finish we will send you a test quantity to thoroughly judge its merits before you commit yourself to any amount. Write today for free offer and descriptive booklet showing colors.

PATEK BROTHERS

Sole Makers
MILWAUKEE, - WIS.



Reinforced Concrete Girderless Floor Construction

Our 24-page illustrated pamphlet describing this system of construction will be sent free, upon request, to architects and others contemplating building for offices, stores, warehouses or factories.

Condron Company

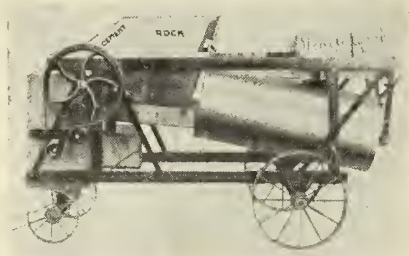
Structural Engineers,
Monadnock Block,
CHICAGO.

while forming the tile, is an additional safeguard provided against loss of alignment and consequent deformation of the green tile.

As a whole, the apparatus, built along lines strikingly different from those followed by a number of tile machines longer on the market, makes use of accepted principles of mechanism that have been tried and approved in connection with heavy duty machinery.

Concrete Mixer Uses Gravity in Mixing.

A light weight, portable concrete mixer, using gravity in the mixing operations, is being marketed by the Girnau Mfg. Co., Eau Claire, Wis.. The cut gives a good general idea of the machine. Simplicity characterizes the 1912 model; hoppers to contain sand, gravel or crushed stone and cement are placed tandem to each other on a 14" conveyor belt. Each



Gravity Mixer

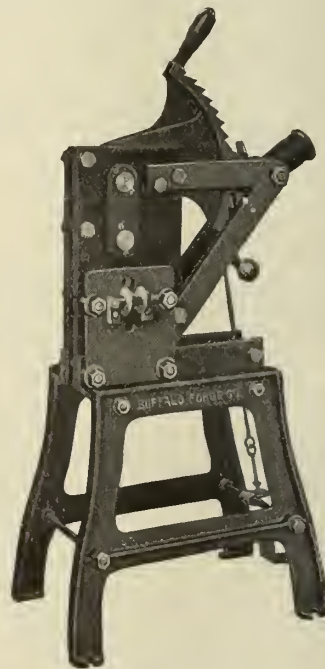
hopper is fitted with a regulating gate, marked with an index line, for governing the rate of flow of material. The proportioned materials, dry, drop to a conveyor belt and are carried to the drum of the mixer. Here they are mixed and mingled, being lifted and dropped repeatedly by flexible steel ribs on the inside of the drum, the ribs being fastened at either end, and free in the middle. The dry mixed material travels a distance of 22 feet in the drum, being under constant mixing action. Water is supplied in a spray just before the mixture leaves the drum. The vibrating ribs mentioned, and a hammer that strikes the outside of the drum twice for every revolution, keep the drum clean and keep the material moving freely. A spiral spring inside the sand hopper keeps the sand stirred continually, and there is a vibrator in the cement hopper, to insure an even feed. Water is supplied from a large tank at the top of the machine.

Owing to the lightness of the machine, the mixer may be put anywhere on the job and moved to any

required position without effort. The manufacturers recommend that it be placed so that concrete is deposited directly from the drum into the forms. As evidence of the machine's lightness, it may be mentioned that the hand power type, with a capacity of 50 yards per day, weighs 600 lbs. The power machine, with a capacity of 100 yards per day, weighs less than 940 lbs. Four men can put the machine anywhere, from the sub-cellar to the roof. The power machine can be run, say the manufacturers, with a 1 h.p. engine. It is fitted with 1½ h.p. for reserve. One man can run it all day, according to reports from men who have done it, and who seem to be enjoying perfectly good health.

New Bar Cutter.

Among users of structural iron and steel rods for reinforcing concrete construction there has long been a need for a bar cutter of lighter weight for moving about and for use on scaffolding. The Buffalo Forge Co., Buffalo, N. Y., has just brought out a machine



Light Bar Cutter

for cutting twisted bars up to 1", and round bars up to 1½", which serves this purpose admirably, as its weight is less than 300 lbs. The frame of this new bar cutter is made of two plates of "Armor Plate" steel, enclosing the plunger knives and other working parts. The tensile strength of this material

(Continued on page 100)

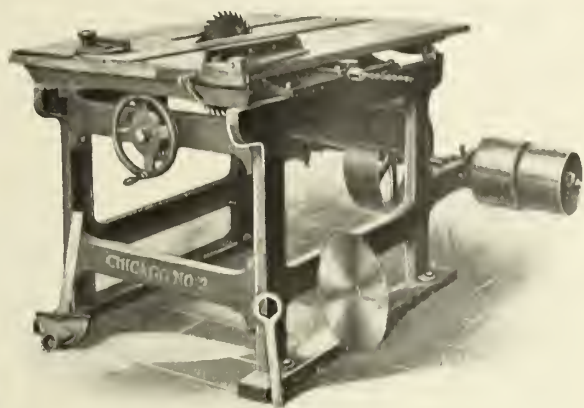
"STONEKOTE" — STUCCO READY TO USE

This prepared Portland Cement Stucco comes in 67 shades of White, Gray, Silver Gray, Buff, Red, Brown. This product will solve your stucco difficulties. Sample Free. We also sell Keene's Cement, Fire Brick for Kilns, R. I. W. Waterproof Paints, Hard Wall Plasters, and general building materials.

GARDEN CITY SAND COMPANY,
909 Ch. of Com. Bldg., CHICAGO, ILL.

BOOK ON "HOW TO APPLY ROUGH-CAST"
This book tells how to apply Cement Stucco to get different finishes. Copy sent free on request.





For Building Contractors

Here is a universal saw table that will save money for any contractor who has to work up lumber for concrete forms or who wants to save money on all his millwork, inside and outside trim. On the job or in the shop, it will serve more different purposes than any other machine.

It will cross cut, rip, miter, bevel rip, dado, bore and tenon. Table 54"x30"; arbor 1 1/8"; weight, 1,000 lbs. Price includes two 14" saws.

**Special Price \$68.00 if You
Mention This Ad.**

Chicago Machinery Exchange

1219-1227 Washington Blvd., Chicago, Ill.



Get at the Heart

Of the
Sidewalk Form Proposition.

INVESTIGATE HELTZEL SYSTEM STEEL FORMS

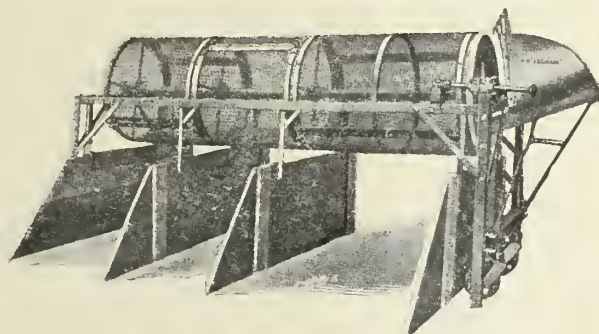
For economic and simple cement sidewalk, curb and gutter construction there is none as good.

Write for Booklet.

See Exhibit at Chicago Cement Show, Space 41.

W. B. JONES BOILER CO.

S Street, Streator Co., Streator, Ill.



Patents pending on the original features of all our Rotary Screens

Improved Converse Rotary Screen

Turned by Hand or Power

**For Sand, Gravel, Crushed Stone, Coal Screenings, Etc.
Any Number of Sizes Separated at One Operation**

Each section is made of two half sections, attached to the cylinder by only six bolts, so they may be easily changed to those having other spaces.

The sections are made in exact sizes and are interchangeable.

If by trial, sections of different spaces between wires are wanted, we exchange.

The casters are a great convenience when it is not desired to locate the screen in a permanent place.

The partitions are removable by turning the turn buttons on the posts.

Purchaser makes partitions from any rough boards.

To run by power remove the crank and substitute pulley.

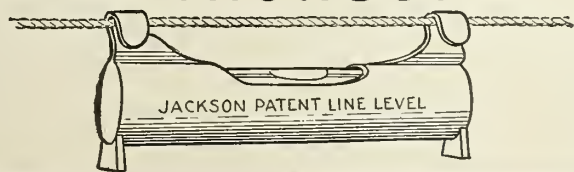
Crank is located at feed end at a comfortable height enabling one man to operate, if desired, by alternately filling hopper and turning crank. Chain transmits the motion from a small sprocket on crank-shaft to a larger sprocket on main shaft, thus taking less power.

We can furnish these screens with electric motor mounted on the screen frame. Prices and further data on application. Send for our approval offer.

F. S. Converse, 101 Chestnut St., Binghamton, N. Y.

See Exhibit at Chicago Cement Show

THE JACKSON ALUMINUM LINE LEVEL



Does the work of a sixteen-foot straight-edge.

May be used on a line or attached to the ordinary steel square or pocket rule. No mechanic should be without one. Useful to masons, bricklayers, concrete block layers, carpenters, contractors, architects, plasterers and engineers.

Circular describing this level sent on request.

**Joseph Woodwell Co., 201 WOOD ST
PITTSBURG, PA**

Send for catalogue of Bricklayers', Masons' and Cement Workers' tools.

Price

\$1.00

Post Paid

Automatic Weighing Machine Company

134 to 140 Commerce Street

NEWARK, N. J., U. S. A.

High Grade Automatic Proportioning Machines

Rock and Shale

Clinker and Gypsum

is 75,000 lbs., with an elongation of 28%,—seven times stronger than cast iron.

Two holes holding the cutting tools are provided in the frame; a stripper in front prevents binding of the metal. The knife plunger is operated by a ratchet; the knives are returned to highest point after cutting by stepping on the treadle; its action in removing the pawl allows the ratchet segment to drop down, ready for the next cutting operation. The lower hole in the frame is for smaller bars and the upper for larger ones. For cutting bars $\frac{1}{2}$ " or smaller a third pair of knives is provided. A feature not to be overlooked is the fact that the knives can be changed without the use of any wrench or other tool. In front of machine a roller is provided for feeding long bars between the knives to prevent the bars from sliding over the cutting edge of its knives and making them dull in a short time.

Practical Block-Making for the Bright Boy.

The American boy is naturally restless, naturally looking for something to do with his hands. It is largely a matter of instruction whether what he does is harmful or good. Every boy likes to "make things," and the tool chest and the lumber pile have kept many a boy out of mischief in the past. But these things are old fashioned, now; the boy's concrete block outfit is the thing. H. G. Simpson, of the Simpson Cement Mold Co., Columbus, Ohio, knows something about boys and knows how to appeal to them. The company has gotten up a miniature block outfit with which the enterprising boy can fill many an hour with entertaining, enjoyable and really useful work. All he needs with the outfit are a little sand, some Portland cement and water.

The outfit is complete and practical. It consists of a frame for holding the plates to make block 2"x2"x2" or 2"x2"x4", with plain, bush-hammered, panel or rock-face designs; cores for turning out hollow block; a mold for copings, cornice, water table, door and window sills, caps, steps and other "dimension stone"; strips for making bevel edges; clamps to keep lines true; a tamper; a tool for finishing rough places; a camel's hair brush for smoothing edges; a stiff brush for cleaning the plates and frames; and a sheet of directions.

Any bright boy can make himself a workshop or a playhouse, a dog kennel or a chicken coop, to say nothing of walls and walks in his own part of the family garden.

Get the boy one of these outfits. It will be a good thing for him, and for you. See which of you can do better work.

New Concrete Floor Surface.

The *Patent Office Gazette* of December 26, No. 1,012,832, contains an article of unusual interest and value to engineers, contractors and all others either directly or indirectly connected with concrete construction and use. Particularly is it of interest in connection with floor work.

Information is given of the fact that there has been patented a process by which a concrete floor or structure may be re-surfaced, the new surface being bonded perfectly to the original structure. This is accomplished by the use of a coating made up in part of a finely ground metallic powder. The process, which is patented by the Master Builders' Co., Cleveland, O., seems to be an invention of practical everyday value. It is designed to be utilized in patching old floors and making new floors wearproof, dustproof and waterproof.

Some difficulty has been experienced with concrete floors where much weight constantly passes over them. They sometimes wear down in places, leaving holes and ruts. This has been caused by the porosity of the concrete—its lack of proper solidity. Such floors often give off dust which, settling in machinery and making friction, has brought delay and loss to factories.

By the Master Builders' method, it is claimed that it will be possible to make floors that are practically indestructible. In the many factories, breweries, laboratories, warehouses, etc., where it has already been adopted, it has been styled a method of "armor-plating" a floor.

The "concrete filler" is composed primarily of a metal powder of cement fineness. This is added to the concrete when mixing. Then, under the influence of moisture while the concrete is "setting," the filler expands through oxidation of the metal, filling up all the voids and air holes, and making a concrete body that is practically solid. By greatly increasing the density of concrete in this manner, the floor is made of almost impenetrable hardness.

The method of adding the filler to the cement may be employed at all times, whether for laying new floor surface or for filling in holes in old surfaces.

It is said that this floor treatment does not involve any fundamental change in the usual manner of laying concrete floors nor any added labor expense.

Inland Steel Co. Expansion.

O. P. Blake has been appointed assistant manager of sales in the organization of the Inland Steel Co., Chicago. His headquarters will be in St. Louis, in charge of the southwestern territory. F. R. Meyer,



"S & N" PORTABLE HAND POWER
BEAM SHEARS

SHEAR—Beams, Channels, Angles, Tees
PUNCH—Beams in Web and Flange
CUT—Rounds, Squares, Flats
COPE—Webs and Flanges at One Stroke
PUNCHES and SHEARS for every requirement

WIENER
MACHINERY CO.

New
York

Dey & Church
Streets

The first thing put into my machines is quality. I tell all about it on pages 151, 152, 153 and 154 of this issue of "Concrete."
HERMAN BESSER.

Jr., is made district manager of sales at St. Louis and J. B. Sharp district manager of sales at Kansas City. A district office will be opened at 511 R. A. Long Bldg., Kansas City.

"Ideal" "B" No. 1 Batch Mixer.

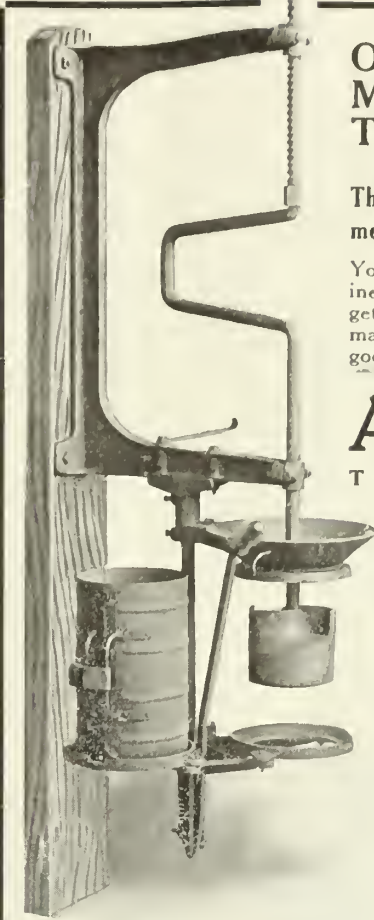
The Ideal Concrete Machinery Co., South Bend, Ind., has just put on the market a batch mixer designed for use in concrete products plants and in other places in which a comparatively small batch, frequently made, is desirable. It is mounted on skids, for easy moving. It is of cast iron and steel throughout, even to the skids, which are of channel steel. The container is mounted on trunnions, bolted to the end of the box, and running in babbitted bearings. This makes for ease in running, with resultant low horse power requirement in operation.

The mixer stands low, being but 36" high in the position required for loading. By using a 24" high platform, the mixer may be loaded directly from a wheelbarrow, while the mixing paddles are in motion. Dumping may be done either by hand or by a cone clutch power dump. For hand dumping machines, 2 h.p. are required; 3 h.p. are required for power dump. The floor space occupied by the mixer in operation is 3x8 feet.

Nearly one-quarter yard of concrete can be mixed at a charge—one sack of Portland cement and six cubic feet of pit run gravel, and one batch a minute can be turned out.

Some cheerful philosophy, tintured with good business sense, is furnished by Ricketson's Mineral Paint Works, Milwaukee, Wis. The firm is sending out a card illustrating a brick. On one side, the card says: "Don't throw brick—at your friend—because you like him. At your competitor—because it merely advertises him. Besides:—If your brick has been laid in mortar colored with Ricketson's 'Red Brick' brand colors, it's too valuable to be thrown. And if it hasn't been so laid, it's hardly worth the throwing. You'll be too satisfied to throw anything if you get your colors from Ricketson's Mineral Paint Works, Milwaukee, Wis." Thus does Mr. Bogk kill two birds with one brick.

The MacArthur Concrete Pile & Foundation Co., 11 Pine St., New York City, has recently taken the following pedestal concrete pile contracts: Foundations for a manufacturing building, Saginaw, Mich., for Hammond, Standish & Co.; Architects, Coles & Mutcheller, Saginaw—foundations for a warehouse building at Hamilton, Ont., for Oliver Chilled Plow Works, Ltd., of Canada; Prack & Perrine are the architects—foundation for a three-quarter million dollar court house for Fulton county, Atlanta, Ga. Over 1,200 pedestal piles are being driven on this job. A. TenEyck Brown and Morgan & Dillon are the architects.



One Man Can Make 1200 Tile Per Day

The Manufacture of Cement Tile is Profitable

You can start in the business with little capital, by getting a hand power machine that turns out a good product at low cost.

ACME

TILE MACHINE

This machine makes tile from 3" to 8" in diameter, all 12 1-4" long. Spiral packer-head packs a strong tile. Operates rapidly and easily.

Write for booklet describing this machine—it looks easy but its really easier than it looks.

Acme Tile Machine Co.
LaGrange, Ind.

Anchor Machines Make Continuous Air Space Blocks



It is easy to lay Anchor Blocks.

The wall that's guaranteed frost and moisture proof. A perfect dead air space from cellar to garret. Standard machine makes blocks 8x24 in.—any width from 8 to 12 in. Junior Machine makes blocks 8x16 in.—any width from 8 to 12 in. All blocks tied together in construction by four quarter-inch galvanized iron rods 8 in. long and turned 1 in. at each end, guaranteed rust proof and everlasting. Write for catalogue and special prices. All machines sold direct to the trade.

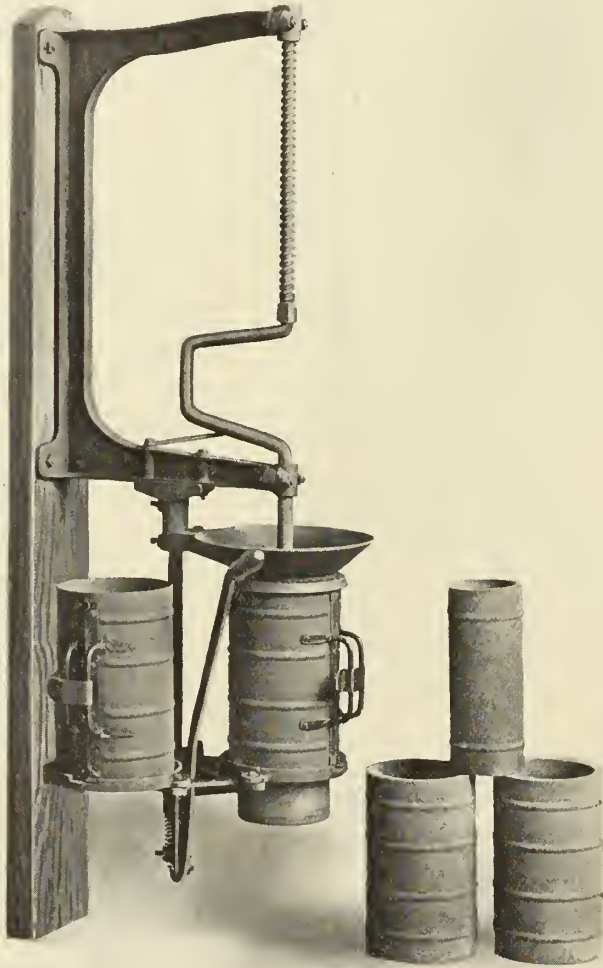
Anchor Concrete Stone Co.

ROCK RAPIDS, IOWA

Hand Power Tile Machine.

Concrete products manufacturers who want to start a tile business in a small way and contractors who find that they have a demand for concrete drain tile will be interested in a new hand power machine designed for the economical manufacture of tile 12¼" long and 3" to 8" in diameter.

This machine consists simply of a frame that may be attached to a wall or a post, containing a spiral,



Hand Power Tile Machine

hand-driven shaft, a spiral packer-head and a pair of movable trays on which the molds rest. The illustration shows one mold in position for filling, with the packer-head at the bottom. When the concrete is put into the mold, the operator sets the spiral shaft in motion and the packer rises, packing and trowelling the tile.

When the packer head is clear of the mold, the twin tray is swung, bringing the second mold into position and enabling the operator to release the tile just made. Only two tile molds are required as the green tile will stand alone as soon as made.

The Acme Tile Machine Co., LaGrange, Ind., is manufacturing this machine and is finding that not only concrete plant owners but also general contractors are interested in the tile business. Many

contractors find it advisable to make their own tile rather than to buy them.

Testing Cement and Concrete.

The architect, engineer or contractor who starts out to make a success of his concrete work is always careful about getting the best materials and often the grade may be determined only by laboratory tests. The same applies to road-builders. To meet this growing demand for laboratory service, many of the big testing laboratories have organized special cement departments. One of these is the Institute of Industrial Research, Washington, D. C.

This organization has established a division in charge of Prévost Hubbard, formerly chief chemist in the Office of Public Roads, U. S. Department of Agriculture. The division is fully equipped with apparatus for testing all kinds of cement, specimens of sand, gravel, slag, waterproofing compounds, bituminous products, road oils and plain and reinforced concrete members.

The contractor who wants to make sure that the sand he proposes to use is properly graded for the best concrete work, may send his specimen to this laboratory and at small expense receive a report showing just how near perfect the sand is, with advice as to what must be done to bring the sand up to the required standard.

Preparing Concrete Surface for Enamel.

The Armstrong Cork Co., Pittsburg, Pa., up to quite recently had difficulty in giving a proper finish to the interior walls of concrete storage rooms. Last fall the company built two storage rooms of concrete for a customer and gave the interiors two coats of "Petrifax" cement coating, manufactured by Dexter Bros., Boston, Mass. They allowed 24 hours to elapse after the first coat was applied, before the second coat was put on. These two coats gave the concrete a very good surface, as a tinted coating was selected. The enamel coat was later put on and after six months there appear no signs of discoloration or peeling. The company expects to follow similar methods in future work of this kind, the object being to give the storage room interior a decorative surface that will at once resist moisture and hard wear.

"Standard" Concrete Mixers.

The Standard Sale & Supply Co., 1345 Wabash Ave., Chicago, Ill., has announced that hereafter the "Eclipse" batch mixer will be sold under the name "Standard." This seems to be a wise move. The mixer has become familiar to the readers of this paper, but the company found that the dissimilarity between the name of the machine and the name of the company was confusing to many.

The City Concrete & Coal Co., Detroit, Mich., will build this spring a new block plant at West Grand Boulevard and Visger St. This plant will supply the building trade in the western part of the city with concrete building units. The company already operates a large plant on the east side.

The Missouri Highway Engineers' Association will hold its next annual convention in Kansas City, Mo., March 14-21, at the time of the show to be held there by the Cement Products Exhibition Co.

The Brown Book of BUNGALOWS

100 pages of designs, plans, illustrations and descriptions of bungalows actually built in different parts of the country. Estimates of cost based on actual experience.

Bungalows—Mission, Spanish, Venetian, Colonial and Georgian types.

Houses—Arts and Crafts and English Timbered.

Public Buildings and Miscellaneous Houses.

Price \$1.00 Postpaid
Concrete Publishing Co.
 Detroit, Mich.

THE USE OF PORTLAND CEMENT IN FOREIGN COUNTRIES.

Philippine Islands.

(From Consul General George E. Anderson, Hongkong.)

Apparently Hongkong has regained its hold upon the cement trade of the Philippines at the expense of American cement exporters. The imports of cement into the islands in the fiscal year 1911 show a large increase in the total receipts, but a decided decrease in cargoes from the United States.

The enactment of the tariff law which admitted American cement free of duty into the islands was followed by a gain in imports of American cement. The imports of cement into the Philippines for commercial, as distinct from governmental, purposes were 28,418 metric tons, valued at \$331,143 in 1908, the United States having no part whatever in the trade. In 1909 the imports were 25,040 metric tons, valued at \$247,425, of which the United States supplied less than \$300 worth. In 1910 the commercial imports were valued at \$416,815 and included 42,776 metric tons, of which 9,227 tons, valued at \$103,078, were from the United States.

This increase in the total imports was more apparent than real, for the reason that the fiscal year 1910 was the first year in which imports of cement for governmental use were included in the commercial import figures.

The increase from the United States, however, was real and represented an effort on the part of American exporters to get trade that theretofore had been largely in control of the Hongkong cement manufacturers in competition with the cement factory at Haifong, in Indo-China, and a Chinese Government-aided factory near Canton. In the fiscal years 1911 the total imports of cement into the islands amounted to 55,480 metric tons, valued at \$526,456, an increase of 12,704 metric tons, valued at \$109,641. The purchases from the United States, however, reached a value of only \$71,436, as compared with \$103,078 the year before, while imports from other countries increased from \$313,737 to \$455,020. While some small shipments continue to come from Germany, Belgium, China and other countries, the greater portion of the trade in the islands is now divided between the Hongkong concern and the Indo-China factory, Hongkong having much the larger portion.

In connection with the figures of the fiscal year 1911, which show a large general advance in imports of cement over previous years, it is noted that, while most of the increase is due to the building of bridges, municipal and other structures, and various public docks and similar works, there has been a notable increase in sales of cement to Filipinos for general purposes. The use of concrete by Filipinos and Chinese in the islands is greatly on the increase. Even in nipa houses the posts are being placed in concrete foundations nowadays. It is likely, therefore, that trade in the future will continue to expand rapidly.

(Continued on page 106)

\$36.00

Complete ready for use with 110 ft. cable, block, boom and load brakes

The Only Practical Hand Power Circle Swing Builders Derrick

for hoisting timber, joists, flooring, door and window frames, stone, iron girders, concrete blocks, concrete reinforcing bars and forms, etc. MACHINES SHIPPED ON TRIAL TO RELIABLE CONTRACTORS. Our Motto is SATISFACTION OR NO SALE. Immediate shipment guaranteed.

LIGHT STRONG AND PORTABLE STIFF LEG DERRICK—built for hand or power. Fitted with crucible steel fittings throughout. When writing for price, give length of boom, capacity and if winch is desired and if so, whether double or single.

LIGHT and STRONG T. P. SETTER DERRICK equipped

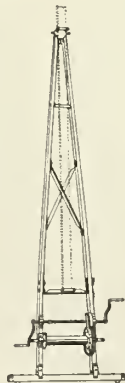
with steel gears and malleable fittings. Capacity 1½ tons. Has a top sheave frame which does away with a block on top. Has lugs for guy lines in front and back, and clamps to clamp an extension pole. PRICE, \$33.00, 18 ft.

SASGEN BROS.

Manufacturers of

CIRCLE SWING STIFF LEG "A" FRAME, POLE AND SETTER } DERRICKS
 2053-57 Racine Ave., - - - Chicago, Ill.
 New York Office: 103 Park Ave.

Write for illustrated circular F.



Catalogs You Ought to Have.

Applying stucco by machinery is described in a booklet issued by the Automatic Stucco Machine Co., 264A Fourth Ave., New York City. It describes the Swenson stucco machine by which exteriors are plastered automatically.

The Panama Canal is described statistically in a folder issued by the Atlas Portland Cement Co., New York City, which is supplying 4,500,000 bbls. of Portland cement to be used on the work.

The importance of expansion joints in concrete sidewalks is emphasized in two booklets distributed by Zeiser Bros., Berwick, Pa., manufacturers of all-steel sidewalk forms and steel dividing plates for use with wood sidewalk forms.

"Expanded Metal Construction" is the name of a bulletin to be issued periodically by the Northwestern Expanded Metal Co., 930-950 Old Colony Bldg., Chicago, Ill. This bulletin will describe uses of expanded metal reinforcing fabric and "Kno-Burn" plastering lath. The first number has just been mailed.

The Universal Crusher Co., Cedar Rapids, Ia., has issued a special folder describing a mounted crushing plant for contractors' use, including a crusher, engine, elevator and dust-jacketed chute screen, all mounted on a 15' steel truck.

"Hot Air Versus Facts" is a booklet issued by W. B. Abbey, Union Bldg., Newark, N. J., New Jersey agent for Bath Portland cement. The Bath Portland Cement Co., Essex Bldg., Newark, N. J., is sending out a booklet describing important construction jobs in which Bath cement played an important part.

Dexter Bros., Boston, Mass., issue a new booklet telling how their concrete waterproofing and decorative products have been used on buildings of different kinds. Many of the structures are shown in photographs.

Cement Appliances Co., 505 Fifth Ave., New York City, sends out a new booklet describing the "C-A-C" cement gun.

A system of concrete construction involving the use of U-shaped concrete brick is described in a folder just issued by the Unit Brick Co., 1123 Broadway, New York City.

The "Little Giant" concrete brick machine is illustrated and described in a new booklet being sent out by the LaGrange Specialty Co., LaGrange, Ind.

"The Mixer with the Bulge" is the title of a striking folder being mailed by the Chain Belt Co., Milwaukee, Wis., manufacturers of the "Chain Belt" concrete mixer.

Concrete pavements laid for \$1.00 per yard, exclusive of grading, are described in a folder being mailed by the Dollarway Paving Co., 95 Liberty St., Chicago, Ill.

The manufacture of concrete burial vaults as an independent business or as a side line for concrete products plants is described in detail in an elaborate catalog just published by the Norwalk Vault Co., Norwalk, O.

The Van Guilder Hollow Wall Co., 728 Chamber of Commerce Building, Rochester, N. Y., is sending out two new folders illustrating houses built by the use of the Van Guilder form for molding solid or hollow concrete walls.

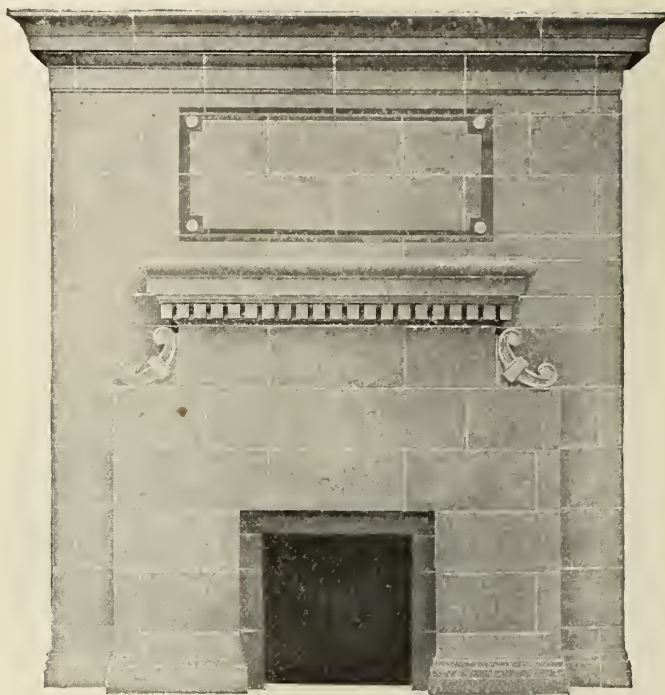
The Allentown Portland Cement Co., Allentown, Pa., sends out a booklet full of illustrations of structures in which Allentown cement was used.

A new type of metal form for molding concrete walls, columns, girders, beams and floors is illustrated and described in Bulletin No. 50 of the Blaw Steel Centering Co., Pittsburgh, Pa.

The Bolte Mfg. Co., Kearney, Neb., has issued a 1912 catalog, detailing the company's large line. This includes continuous mixers, culvert and bridge forms, gasoline engines, sidewalk forms, brick machines, block machines, finishing tools, steel facing and mortar boxes, wheelbarrows and tamping machines.

Bulletins 48 and 49 of the Blaw Steel Centering Co., Pittsburgh, Pa., are devoted to steel forms for concrete wall construction and to subway construction. The company's sheet steel lagging and its advantages are intelligently discussed in No. 48 and Bulletin 49 reprints the article by S. P. Brown, M. Am. Soc. C. E., originally published in *Engineering News*.

Reichert silos, that is, silos built in forms made by the Reichert Mfg. Co., Milwaukee, Wis., are illustrated and described in a neat piece of publicity literature recently issued by the company.



Concrete Mantel made of "Ideal" Block and Dimension Stone

Monolithic silos and the best methods of constructing them are detailed in a handsome booklet issued by the Polk, Genung, Polk Co., Inc., Fort Branch, Ind. There is some good silo talk furnished and a brief and interesting history of the use of Portland cement concrete is given to the reader.

Blystone batch mixers, one of the machines upon which rests the reputation of the Blystone Mfg. Co., Cambridge Springs, Pa., are attractively described in a catalog issued by the company. The illustrations and the text are alike clear and convincing.

"Gravity Concrete Mixer" is the title of an instructive booklet issued by the Girnauf Mfg. Co., Eau Claire, Wis.

A lot of information regarding the construction of concrete culverts is contained in a new booklet being distributed by the Merillat Culvert Core Co., Oak and Railroad Sts., Winfield, Ia., manufacturer of a special form of core form for building culverts and small bridges.

Two booklets on waterproofing are issued by George W. de Smet, 419 Chamber of Commerce Bldg., Chicago, Ill., distributor of "Symmentrex," an interior flat finish, and "Dehydratine," a compound used for waterproofing basements, exterior masonry, foundations, etc.

The Arnold-Creager Co., New London, O., issues a comprehensive catalog of special carts, barrows and trucks for the economical handling of concrete and clay products.

Joseph T. Ryerson & Son, Chicago, Ill., announce the establishment of a district office at 828 Ford Bldg., Detroit, Mich., in charge of R. J. Stayman and J. H. Marlotte. The firm's growing business in machine tools, fabricating equipment, drills and rolled steel products in Detroit is the reason for the new move.

The Chain Belt Co., Milwaukee, Wis., manufacturer of malleable iron and steel chain belt, sprocket wheels, elevating and conveying machinery and the Chain Belt concrete mixer, has moved its offices in Chicago from Monadnock block to the Old Colony Bldg., 900-902. Benj. S. Reynolds will be in charge of the elevating and conveying machinery department, with Walter B. Louer to look after the Chain Belt mixer.



Sellwood Swimming Tank, Portland, Ore.—Waterproofed with Trus-Con Waterproofing Paste

Positive, Permanent Waterproofing Results with Trus-Con Waterproofing Paste.

Read this interesting testimonial which comes unsolicited from the Glenmore Distilleries Company at Owenboro, Ky., under date of November 10th, 1911: "Regarding the use of Trus-Con Waterproofing Paste for the construction of tanks and cisterns, we are pleased to advise that last summer we constructed a beer well 16 feet in diameter by 12 feet deep, using a 1:2:4 mix of

washed gravel concrete, and mixing this with Trus-Con Waterproofing Paste as per your standard specifications. Two days after this beer well was poured it was surrounded with water to within one foot of the top, but so far we have yet to see the slightest sign of seepage, and it is apparently absolutely water-tight."

Write for our new FREE booklet, "Science and Practice Combined in Waterproofing." Twenty-four pages of concise information, valuable to concrete men.



TRUSSED CONCRETE STEEL COMPANY

450 Trussed Concrete Bldg.

DETROIT, MICH.



THE ARNOLD CONCRETE MIXER

☐ Materials mixed while you are carting them from the gravel pile to the forms.

THE ARNOLD CONCRETE MIXER is operated by two men—no power is needed—and turns out an excellently mixed concrete in four revolutions, or by moving the Arnold MIXER 50 feet. The combination of proper shape and the blades on the interior make possible the complete mixing and depositing of each batch of 2.7 cu. ft. in 3 minutes.

Can be successfully used at low operating cost on road building—as work progresses machine follows. For use in concrete product plants for depositing batches at any point. In new building work or repair work the ARNOLD MIXER can be moved right to the spot of the work.

Write for the details and prices

F. T. ARNOLD

224 William St.,

New London, Conn.

*(Continued from page 103)***Turkey.***(From Consul General G. Bie Ravndal, Constantinople.)*

Cement forms an important item of Turkey's purchases from France, Austria-Hungary, Germany, Russia, United Kingdom, Belgium and Greece.

An English cement known as the Hollick brand is handled by a local company that is under contract to sell at least 2,500 tons a year. The price of this brand is 51 francs (\$9.843) per ton of 1,000 kilo (1 kilo=2.2 pounds) sold in sacks. When sold in barrels (1 barrel=180 kilos) the price is 48 francs (\$9.264) per ton. Another English cement is the Johnston brand, the agents of which in Constantinople dispose of about 500 tons annually. The price is 49 francs (\$9.457) per ton in barrels.

Austrian cement, known as the Beochiner cement, from Budapest sells to the extent of about 7,000 tons a year. The price is 46 francs (\$8.878) per ton, sacks included. The price in barrels is 43 francs (\$8.229) per ton, barrels included in weight. About 3,000 tons of Lankenfelt cement from Trieste are sold each year at the same prices as the brand just mentioned.

The largest cement exporters into Turkey are the Germans, due principally to the extensive use of their product in the construction of the German railroads in Anatolia. The Westphalia Cement Syndicate sells about 10,000 tons of cement to Turkey. The price, in sacks of 50 kilos each, is 43 francs (\$8.299) per ton, an allowance of 6 cents each being made upon the return of the sacks. When sold in barrels the price is 46½ francs (\$8.975) per ton. The increase in price of barrel cement is due to the high cost of wood in Germany.

France at first held complete control of the Turkish cement market, but it has lost its popularity. In a few years the Turkish importation of French cement has fallen from 30,000 tons to 5,000 tons per year. The Ciment Rockford sells for 25 francs (\$4.825) per ton in barrels of 150 kilos and for 27 francs (\$5.211) per ton in barrels of 80 kilos. The Ciment Demidi sells for 30 francs (\$5.79) per ton in barrels of 150 kilos and for 32 francs (\$6.176) per ton in barrels of 80 kilos.

The Russian cement is known as Gelenjig. It is almost a natural cement, very good in quality. About 3,000 tons per year are disposed of. The price is 38 francs (\$7.334) per ton in sacks, cost of sacks not included. The price in barrels (180 kilos) is 44 francs (\$8.492) per ton.

The Greek cement sold in Constantinople is the Tinos cement made in Piraeus. This is used as a matter of patriotism by the Greek architects of Constantinople, of whom there are a great number. About 1,000 tons are sold annually. The price of this cement is 46 francs (\$8.878) per ton in sacks, cost of sacks not included. The price in barrels is 44 francs (\$8.492) per ton. At the present time (October) two cement factories are being built in Gebshi, Asia Minor, on the Anatolian railroad. One will have an annual production of 20,000 tons and the other of 25,000 tons of cement. These factories, which are being built by Greeks, will be ready in three and six months' time, respectively.

A Belgian cement is also in the market, having a sale of about 3,000 tons per year. The cost of this cement, sold in barrels, is 45 francs (\$8.685) per ton. The only white Portland cement used at present is Ciment Gracie. It sells for 54 francs (\$10.422) per ton, in sacks.

Due note should be taken of the fact that all prices quoted above are c. i. f. Constantinople.

Cement is used in Turkey for stairs, and tiles, and for decorative purposes. Foundations are now laid in iron and cement to resist earthquake shocks. Buildings are generally faced with a lime and sand mixture, although sometimes ordinary black cement is used, after which it is lime washed.

Ten years ago no Portland cement was used in Turkey. Since then there has been a continuous growth in its employment until in Constantinople alone there has been a 30 per cent yearly increase in the use of cement. After careful study an expert estimates that 130,000 tons of cement can be utilized in Turkey at present; of this quantity only about 40,000 tons are supplied by Europe. There is a splendid opportunity for American cement to enter the local market if in selling price it can compete with the products of other countries. The question of credit must also be taken into consideration. English companies give the minimum credit of three months, while Greek firms allow the maximum credit of eight months; others extend a credit varying between four and eight months. From this it will be seen that cash-with-order transactions are out of the question.

Because of building demands in European countries and the need of cement for their respective local markets the price of cement in Turkey is going up. This ought to form an opening wedge for American manufacturers. The market for white Portland cement is very good, owing to the existence of but one competitor, and that one of cheap quality.

Zanzibar.*(From Consul Alexander W. Weddell.)*

A certain quantity of English, Belgian, German and Norwegian cement is brought into Zanzibar for local consumption and for distribution to the mainland. The greater quantity used is of English manufacture and the largest single local consumer is the Department of Public Works. A good deal of cement is being used on the two German railways, which are being extended, leading out of Tanga and Dar-es-Salaam, and the Public Works Department of the East Africa Protectorate is also a consumer. A local dealer has expressed the fear that on account of greater distance and consequently higher freight rates American cement could not compete with the European products. In quoting terms it would seem almost essential that they should read c. i. f. Zanzibar, or Mombasa, or Dar-es-Salaam, as do the prices of the European producer.

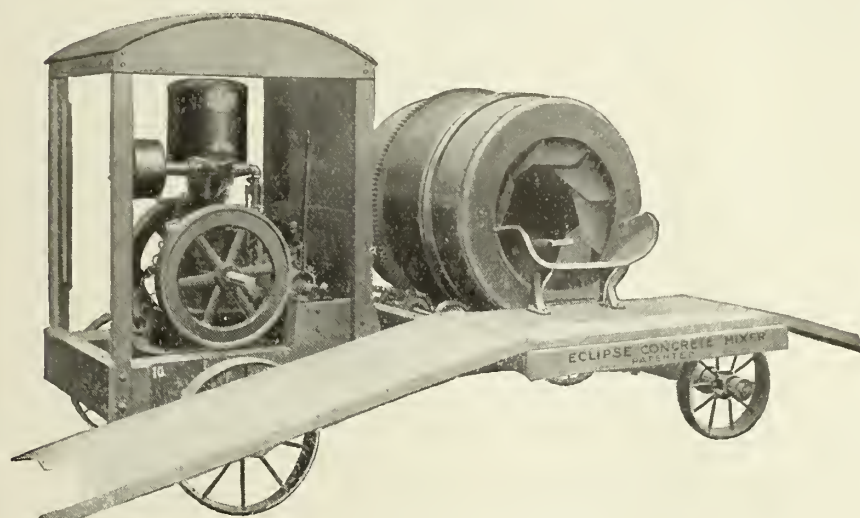
At all the coast ports cargo is unloaded by means of lighters, and is often exposed, especially during the rainy season, to bad weather. The Belgian cement is received in wooden casks, tin-lined, the German and English in iron drums, and the Norwegian in casks, lined with a thick waterproof paper.

“THE STANDARD”

(Formerly “Eclipse”)

LOW CHARGING MIXER

For Inside Concrete Work



The simple construction of “The Standard” Mixer will enable it to be placed inside of buildings so that the work can proceed during cold weather.

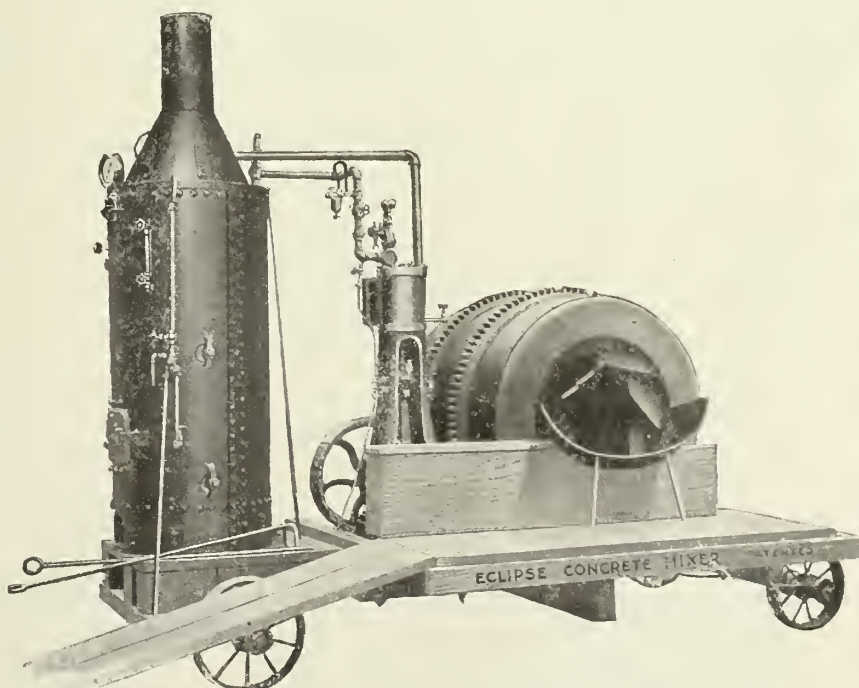
The mixer mounted on skids will go through an ordinary door in the majority of buildings. The drum can be removed and skids turned on edge and quickly moved by few men.

The outfit mounted on skids for belt drive is specially desirable as electric motor or engine can be placed to one side and be moved separately from one place to another.

A large amount of work can be accomplished by using “The Standard” Low Charging Concrete Mixers as suggested above and on rush contracts you will find yourself away ahead by the time spring weather opens.

Are you an up-to-date, wide awake, money making contractor? If so you will want “The Standard” Low Charging Mixer. If not, you will need it.

Write for catalogue No. 36 and secure further information regarding the advantages of this mixer for winter work and for work at any time.



The Standard Scale & Supply Co.

CHICAGO

1345-1347 Wabash Avenue

PITTSBURGH

243-245 Water Street

PHILADELPHIA

35 South Fourth Street

NEW YORK

136 West Broadway



ATLAS

PORTLAND CEMENT

Atlas is being used exclusively on the six enormous double locks and Gatun Dam on the Panama Canal. There were 4,500,000 bbls. required for this work, the largest single order ever placed for cement. The work of building the canal is the greatest engineering feat since the Christian Era began.

The first dam to span the Mississippi River is now being built between Keokuk, Iowa., and Hamilton, Ill., by the Mississippi River Power Co. This work will require 650,000 barrels of Atlas, which is being used exclusively in its construction.

Atlas---The standard by which all other makes are measured.

We Also Make



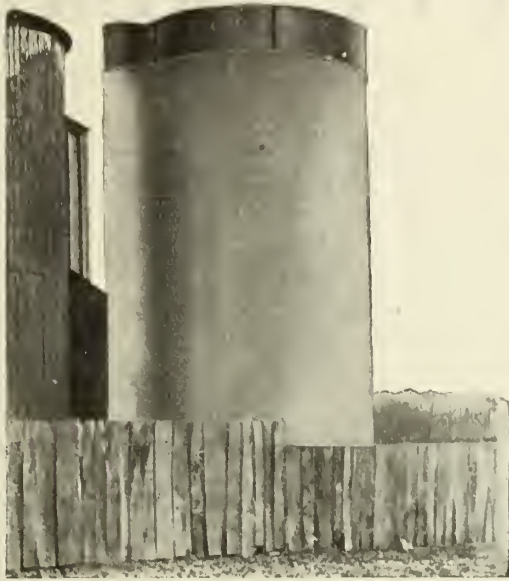
The Non-Staining Portland Cement of quality. The granite exterior of the New Municipal Building, New York City, is being laid and backed with Atlas-White because it is Non-Staining.

If you cannot get Atlas or Atlas-White, write to

THE ATLAS PORTLAND CEMENT CO.
DEPT. F 30 BROAD STREET NEW YORK
MORRIS BLDG. PHILADELPHIA, PA. CORN EXCHANGE BANK BLDG. CHICAGO, ILL.

Largest productive capacity of any cement company in the world. Over 50,000 bbls. per day





14 x 40 silo near Reading, Ill., built by Contractor O. G. Armstrong. One section of mould left in position preparatory to building water tank.

Book About Silos

You should know more about the profits to be made in concrete silos. Learn the cost and the methods.

Monolithic Silo and Construction Company

854 Peoples Gas Bldg., Chicago, will send a free booklet about monolithic silo construction to any reader of CONCRETE who asks for it.

You Can Make Big Money Building

Concrete Silos

It isn't necessary to dwell on the demand for concrete silos. Every contractor knows that up-to-date farmers and dairymen are demanding the more permanent structure to take the place of the expensive, unsatisfactory stave silo.

From 75 per cent to 100 per cent profit can be made by the contractor putting up concrete silos, providing he uses the right equipment. At the same time, the silo costs the farmer less at the end of five years than any other form of construction.

Our metal moulds for silos are made in two sections, each 3 ft. high. Both are set up on the foundation and filled. The lower one is removed and placed on top for another course, and so on. The course most recently poured is always retained in its form until set. Six feet of wall can be built each day.

Each set of silo forms includes a special form for moulding concrete chute at the same time that the silo walls are poured. Provision is made for steel ladder embedded in the concrete and continuous wooden doors fitting in grooves in the concrete door-jambs. The concrete is mixed wet. Roof is also made of concrete. A complete proposition.

This is a business that should appeal to every small-town contractor. The same moulds will make reservoirs, tanks, storage cribs, etc.

The Low-Down Force-Feed Concrete Mixer

HAS SEVERAL FEATURES NOT FOUND IN ANY OTHER MACHINE

With the Low Down Hoppers one man can do the work of two, as he is not required to lift the sand, stone and cement so high.

The Chain Elevator acts as a force feed, forcing the sand, stone and cement, wet or dry, into the Mixing Trough.

The Gates at the end of the hoppers are adjustable up or down to regulate the quantity, and the Mixing Trough runs from twelve to eighteen inches longer than regular, which gives a more thorough mix.

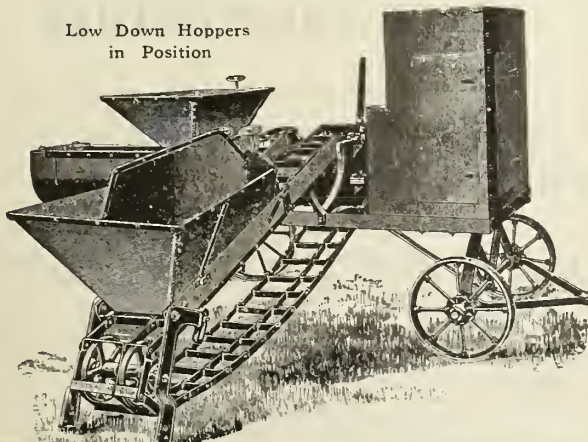
We do not have any frictional sliding measuring device to wear out when coming into contact with sand and cement.

The Mixing Trough and Paddles are easily cleaned because they are not covered up with hoppers. It is constructed of malleable and steel throughout.

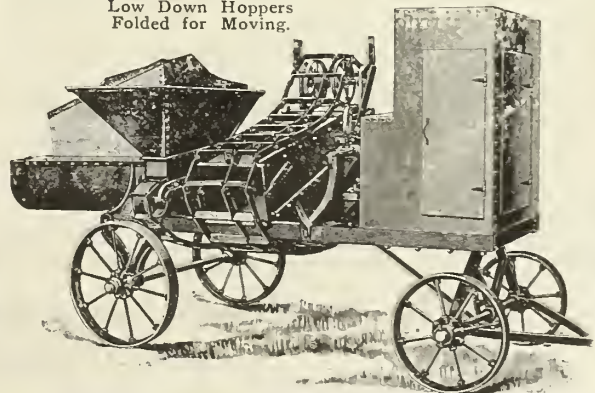
Write us about our special proposition.

ELITE MANUFACTURING CO. NO. 600 OHIO ST. ASHLAND, O.

Low Down Hoppers in Position



Low Down Hoppers Folded for Moving.



MASON SAFETY TREAD

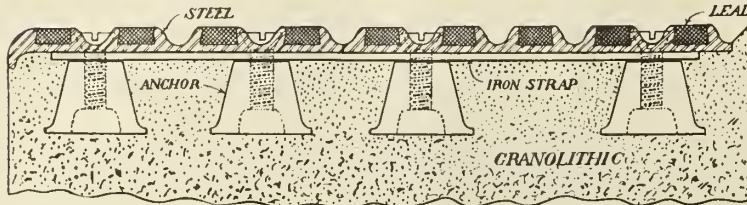
THE ONLY PERFECTLY SAFE TREAD

Should be used on all STEPS—ESPECIALLY CEMENT, also on all public floors and sidewalks. An absolute preventive against slipping on stairs, landings, inclined ways, car steps, sidewalks or any place that may become smooth. Can be fastened to anything, new or old. Will outwear any other surface. In use in every commercial center in America. Write for catalog giving full description and showing where it is in use near you.

American Mason Safety Tread Co., 704 Old South Building, Boston, Mass.

7½" WIDE WITH NOSING EDGE

MASON SAFETY TREAD



15 Days Absolutely Free Trial

You to be sole judge at the end of that time—
if you will purchase a Sanford Press Block Machine.

It is a fact that concrete blocks made by the pressure method are more dense, more uniform, with sharper corners that are as dense as the center of the block, than can possibly be made by the tamp method.

This means more profits.

It is a fact that in the saving of labor cost alone you can pay for a Sanford Press in six months' time, to say nothing about the better quality of block that you turn out.

This means more profits.

It is a fact that you can double your output on a Sanford Press with the same amount of labor cost. You will have no trouble in securing men because the work is easier, and your blocks at the end of the day have the same density as the first block made in the morning. **This means more profits.**

This machine is interchangeable and can be adjusted to make blocks from 4 to 24" in length, 6 and 8" height of face, 4, 6, 8, 10 and 12" thickness of wall; fractional parts to full capacity of the machine are made at one operation, and any

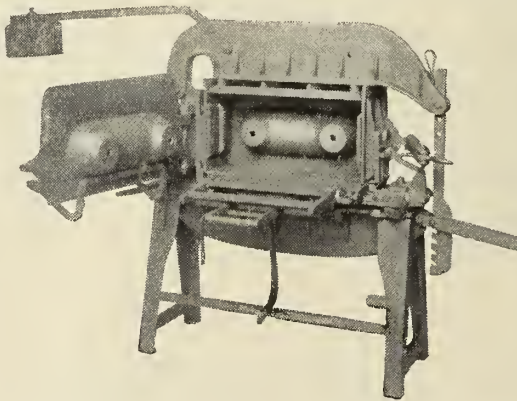
face design that may be desired.

You can make any curve or angle block, header bond two-piece system, metal tie two-piece system, slab or veneer block, hollow block, with vertical and horizontal air space, silos, water tables, etc.

You can face your block on one or all four sides at one operation of the machine. In fact, you can make anything that is ordinarily required in building construction.

It is absolutely the only down-faced hollow block pressure machine on the market, and is protected by

broad basic patents.



**SEND FOR
MIXER PROPOSITION**

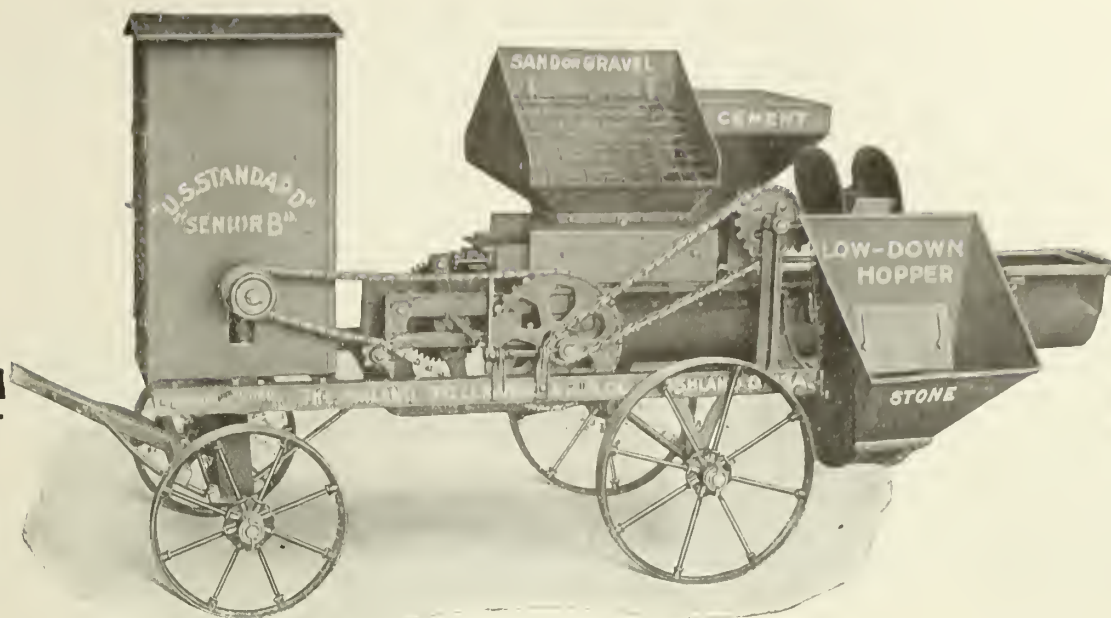
You take no risk—just say the word and a "Sanford" will be placed in your plant to be tested out to your own satisfaction for 15 DAYS.

ABSOLUTELY FREE TRIAL

You are under no obligation at the end of the free trial—if you can fairly say that the "Sanford" does not turn out a better block and more of them—you send it back.

Think of that. Write today and get full information on the GREATEST BLOCK MACHINE offer ever made. Send us your name and address and we will send you a proposition that will certainly open your eyes. Be on the safe side and write us NOW. There is not a better machine made at any price. Don't wait—do it now while you think about it.

The Sanford Concrete Machinery Company
TOLEDO, OHIO



U. S. Standard Senior B. Concrete Mixer

This type of the well known U. S. Standard Self-Proportioning Continuous Mixers is a three-hopper machine designed for general contract work. It accurately proportions cement, sand and gravel or stone up to 2½ in. in diameter, and feeds these materials positively. Capacity, 90 to 100 yards per day. Note the low down stone hopper.

Special types for all kinds of concrete work. Ask about our Block Plant Mixer, mounted on steel base.

Get Our Catalog

Our new catalog D will save money for you. Lists continuous mixers and face-down block machines. Write for a copy today.

At the Cement Shows

See U. S. Standard Concrete Machinery on exhibit at the New York Cement Show, Space 188; Chicago Cement Show, Spaces 226, 227 and 228.

The Ashland Steel Range & Mfg. Co.

MANUFACTURERS OF

U. S. Standard Concrete Machinery
ASHLAND, OHIO.

U. S. Standard Face- Down Block Machine

One of the oldest face-down machines on the market. From four to six oval cores in each block, cutting down material costs without weakening the block. Use wetter mixture than with other machines.

If you are in the market for a block machine, write for full information about the U. S. Standard.

TAKE OUR WORD FOR IT

THE MOST PERFECT BARROW FOR HANDLING LIQUID CONCRETE, SAND, GRAVEL AND BROKEN STONE

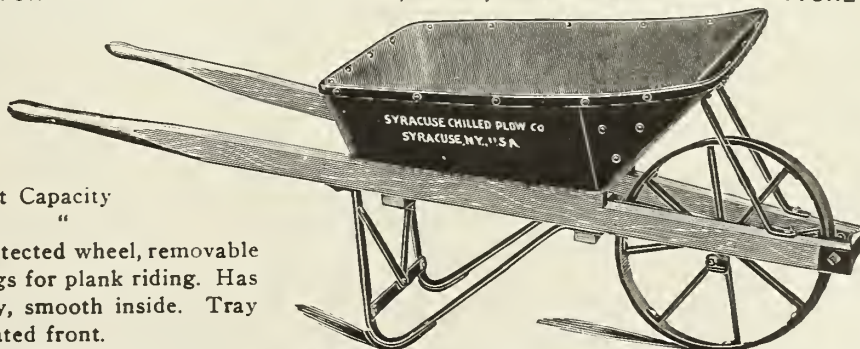
ORDER A TRIAL LOT ON OUR SAY SO

After that you will never be in doubt
as to what Barrow to buy

No. 75-A 3½ Cubic Feet Capacity
No. 79-A 4 " " "

Is an end dumping Barrow, has protected wheel, removable shoes on legs, cross bar between legs for plank riding. Has an extra strong strapped steel tray, smooth inside. Tray placed well forward and with elevated front.

SYRACUSE CHILLED PLOW COMPANY, SYRACUSE, N. Y.



barrows, carts and cars for the concrete products plant.

Our line includes every type of wood, steel and iron cart, barrow and car used for the economical handling of concrete materials and products. Cut down your labor cost, save floor space and increase your output by handling your product easily and cheaply.

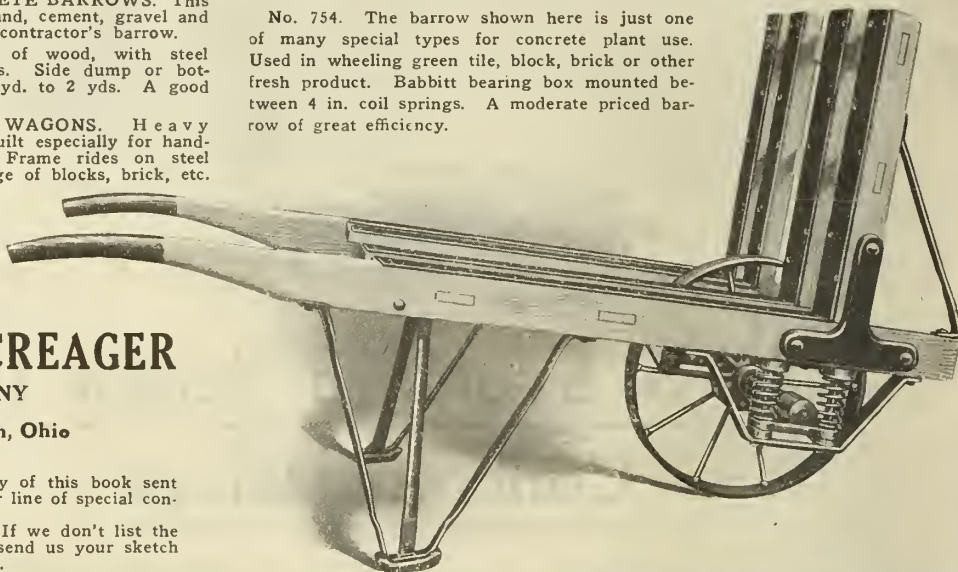
STEEL TRAY CONCRETE BARROWS. This type is widely used for sand, cement, gravel and mixed concrete. A good contractor's barrow.

DUMP CARS. Built of wood, with steel frame. For dry materials. Side dump or bottom dump. Capacity, $\frac{3}{4}$ yd. to 2 yds. A good car at a low price.

CONCRETE BLOCK WAGONS. Heavy frame, wide-tired trucks built especially for handling concrete products. Frame rides on steel springs to prevent breakage of blocks, brick, etc.

SEWER PIPE BARROWS. Ask about our special type of trucks and barrows for sewer pipe and drain tile plants.

No. 754. The barrow shown here is just one of many special types for concrete plant use. Used in wheeling green tile, block, brick or other fresh product. Babbitt bearing box mounted between 4 in. coil springs. A moderate priced barrow of great efficiency.

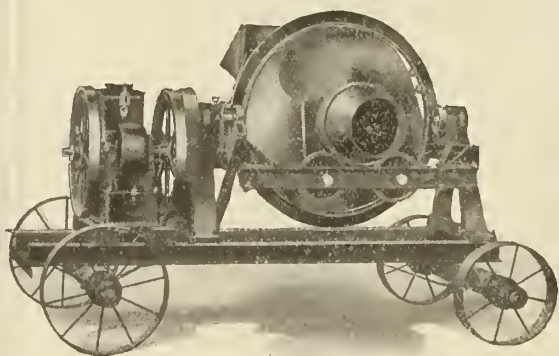


THE
ARNOLD-CREAGER
COMPANY

New London, Ohio

OUR CATALOG. Copy of this book sent on request. Illustrates our line of special concrete plant equipment.

BUILT TO ORDER. If we don't list the car or barrow you want, send us your sketch and we'll build it to order.



This Polygon Junior Mixer

Is just the right size for the contractor putting in Sidewalks, Foundations, Floors, Retaining Walls, Culverts, Small Bridges, etc.

Light and portable—weighs 2650 lbs.—holds six cubic feet.

Will mix concrete for less than one cent per cubic yard.

It's reasonable in price.

Waterloo Cement Machinery Corp'n.

Waterloo, Ia.

Manufacturers of the Great Polygon Line of Mixers, Contractors' Hoists, Derricks, Material Elevators, Etc.

The "Kent" Precision Mixer

It is a well built concrete mixing machine, built on scientific principles. It measures and proportions materials accurately and delivers mixed concrete at lowest cost. Get our mixer catalog. Ask about the "Kent" Mortar Mixer.

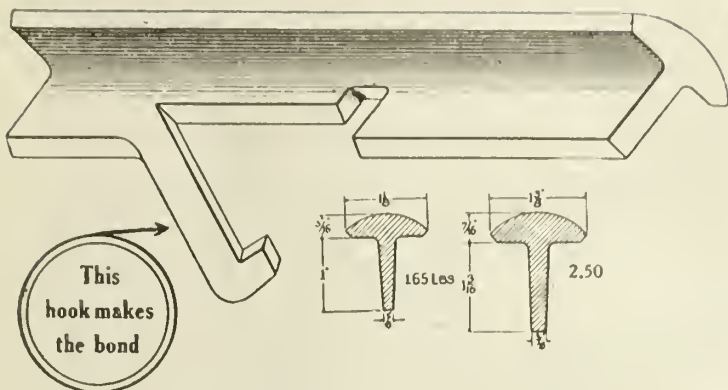


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Kent Machine Co.

310 N. Water St. Kent, Ohio

J. F. Davis & Co., Kansas City, Mo.
Dodge & Dodge, 1133 Broadway, New York.
M. G. Dennison & Co., 144 Cutler Bldg., Rochester
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Sanford Concrete Machinery Co., Toledo, O. The W.
E. Austin Co., 2 Spring St., Atlanta, Ga. New Orleans,
Houston, Dallas, Oklahoma City, Memphis, Roanoke and
Norfolk. The Beebe Co., Portland, Oregon.



EBCO Hook Curb Bar

is a steel member to be embedded when the concrete is poured, forming a permanent protecting edge and acting as a reinforcing member as well.

These bars have shear members which bond perfectly with the concrete. Rolled in straight lengths and in curves for street corners. They come in 10 ft. lengths, seven anchors in each length. Write for circulars.

Edward E. Buhler & Co.

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Sales Office: 103 Park Avenue - - - New York City

Factory: Pittsburg, Pa.

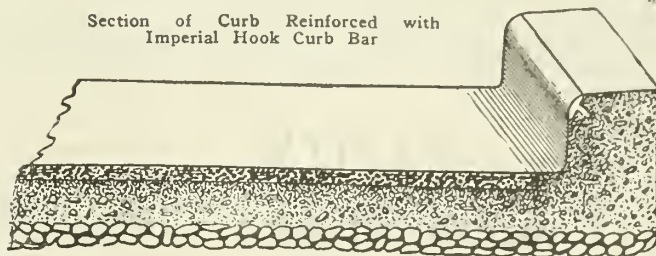
Western Agents: Waterhouse, Price Co., San Francisco, Cal.

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Protect and Reinforce the Corners of Your Concrete Curbing

City engineers and contractors who have had trouble with the old sandstone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear.

Section of Curb Reinforced with Imperial Hook Curb Bar



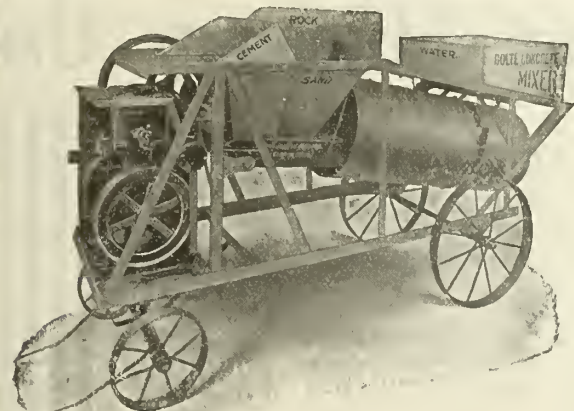
All who contemplate purchasing a concrete mixer, should investigate a "BOLTE." WHY? Because they are the best all purpose mixer for the price on the market. Hundreds are in use giving entire satisfaction.

If in the market for Block or Brick machines, Power Tamper, Gasoline Engine, Sidewalk, Culvert or Bridge Forms, Finishing Tools, Wheelbarrows, Steel Facing or Mortar Box—

Ask for our No. 12 Catalog, stating what you are in need of. Let us quote you Prices and Terms!

THE BOLTE MFG. CO.

Kearney, Nebr.



Machinery and Supplies

¶ If you don't see what you want advertised, ask us about it. We can tell you where to get it and what it will cost.

Buyers and Sellers Dept.

Concrete Pub. Co., Detroit, Mich.

THERE'S A REASON WHY

No. 60, Cement Waterproofing and Bonding, Des Moines Elaterite

Is superior to every other waterproofing and bonding material.



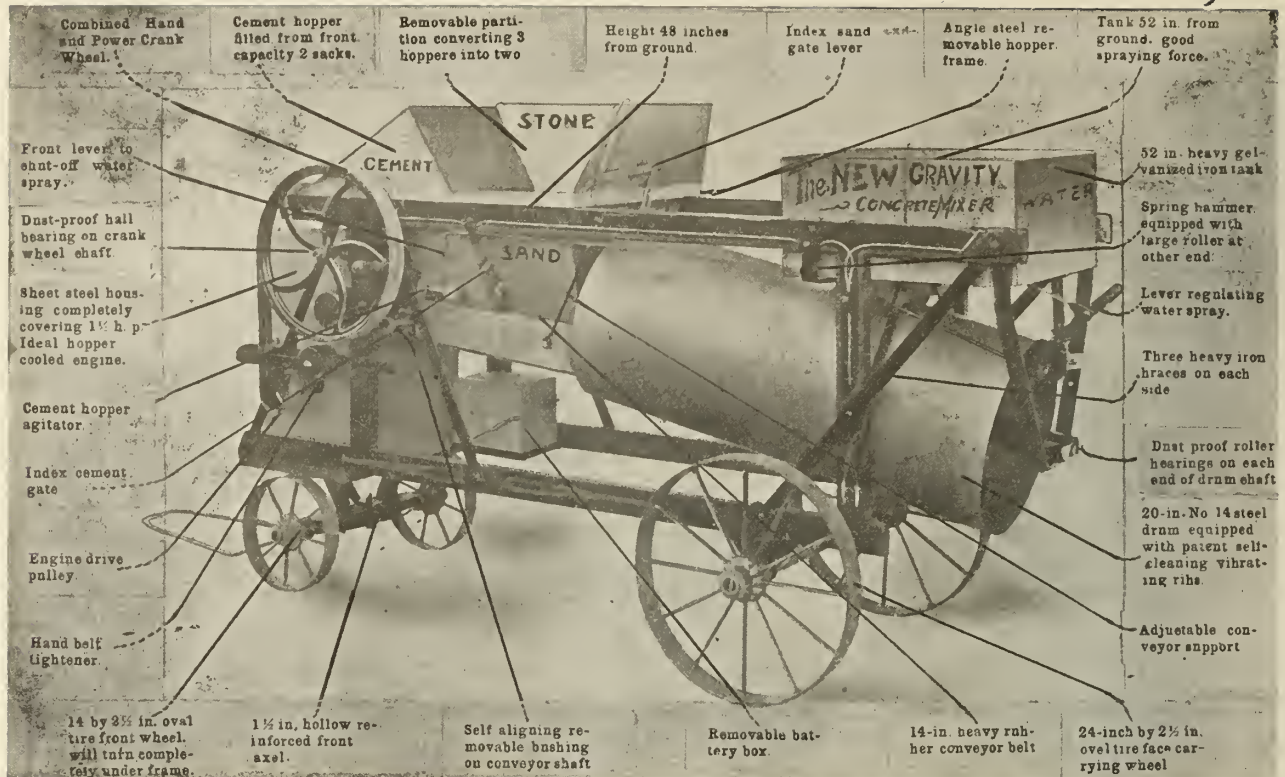
It's the natural characteristics of the rubbery pigment—intensely adhesive, bonding quality, resistance to all acids, absolutely waterproof character, permanent elasticity.

Recent tests showed adhesive, bonding strength equal to 160 lbs. per square inch, giving a permanency and a resistance to water pressure not found in any other waterproofing material.

Plaster coats are applied directly over it, the adhesive, bonding strength holding them firmly and permanently. (See cut.)

Catalogue "W" with full information on request.

THE ELATERITE PAINT & MFG. CO., DES MOINES, IOWA

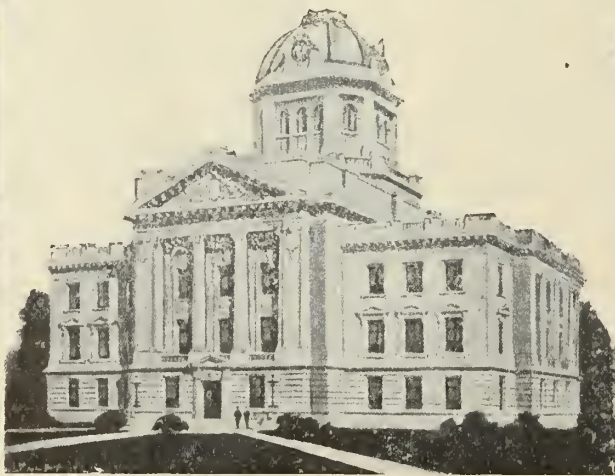


The GRAVITY Concrete Mixer

The ONLY practical, self-proportioning continuous mixer on the market to day. Write for catalog which explains fully the mechanism of the machine with its relation to practical concrete work.

Girnau Mfg. Co., 121 S. River, Eau Claire, Wis.

For Highest Waterproof Efficiency Use



"WATECO" No. 101 Used to Dampproof all walls of
Kankakee County Court House, Kankakee, Ill.
Z. T. Davis, Arch't, Chicago



WATERPROOFING PRODUCTS

As "WATECO" Products, we manufacture asphaltic paints, compounds, mastic, cements and felts for every kind of waterproofing, dampproofing, insulating and coating usage.

"WATECO" Black Compounds depend for their success upon the application to stone, brick or concrete of an impervious waterproof shield, bonded to the wall, but free from the imperfections of the wall itself. This principle of an elastic shield rather than an integral mixture is the only waterproofing principle declared competent by engineers and architects of standing.

Waterproof Engineering Company

Efficiency guaranteed and proven by years of successful experience. Contracts a specialty. Information, advice and consultation gratis.

WATERPROOFING ENGINEERS AND CHEMISTS.
Sole Manufacturers of
"WATECO" Waterproofing and Dampproofing Compounds and "WATECO" Pressure System for resisting higher water pressure.

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SEE OUR EXHIBIT IN BOOTH NO. 126, CHICAGO CEMENT SHOW

Toch Brothers

Inventors

and

Specialists in Technical Paints

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"Liquid Konkerit"

Patented

A Cement Paint for Walls

"Toxement"

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For Waterproofing Cement

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A Cement Paint for Metal

**"Cement Filler and Cement
Floor Paint"**

Patented

"Toxloxpore"

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Colorless Damp Proofing

"Cement Colors"

First Made and Still Best

60 Different Colors

INVENTORS AND MAKERS OF

"R. I. W." Damp Resisting Paints

"DIFFERENT FROM ALL OTHER PAINTS"

WRITE US FOR DETAILED INFORMATION

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Established 1848

320 Fifth Avenue, New York

Works:

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TORONTO, CANADA

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Simmons Sectional Concrete Pile Casings

Are Carrying the Dead Loads of Buildings and the Live Roads of Railroads

Over 2,000 Linear Feet are Supporting New York Structures



For underpinning and where head room is limited, this construction of a pile is unequaled.

We have instances where a pile has been driven over sixty feet without losing its alignment or buckling.

They can be hammered, jacked or jetted in place. Piles of any ultimate length can be built up during the progress of driving.

The sections can be made from 4 to 20 feet long to suit the conditions. Our stocks can be drawn from to supply any desired length of piles.

Send for circulars and prices.

We are equipped for all kinds of Special Machine Shop Work—in Piping, Columns, Railings, Roof Structures, Cold Storage, Flag Poles, Fittings, Valves, Tools and Specialties for Contractors, Engineers, Water Works and Industrial Plants.

John Simmons Co.
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Ottawa, Illinois

Largest Miners and Shippers of White Sand in the United States

Washed and Steam-Dried

White Sand

Unexcelled for

Facing Concrete Blocks, Ornamental Concrete Stone, White Plaster, Exterior Plastering, Roofing, Sawing Stone, Marble, etc.

You can order less than a carload, in fact shipments as small as five 175 lb. bags can be delivered economically

Analysis 99.90 Pur Silica

Prices, Freight Rates and Samples on Application

WHAT, Porous? You Say Porous? LISTEN

Give to them the chance PORTLANDS deserve. Cater to them instead of to the patent medicines—paste and powders—you have bought.

Get on terms of intimacy with the Best, Most Versatile Product Ever Made.

Portland Cement

and discover, as you then will

THE BEST WATER-PROOFING ON EARTH

THE MOST POSITIVE OF RESULTS;
THE MOST ENDURINGLY EFFECTIVE;
THE MOST ECONOMICAL OF ALL.

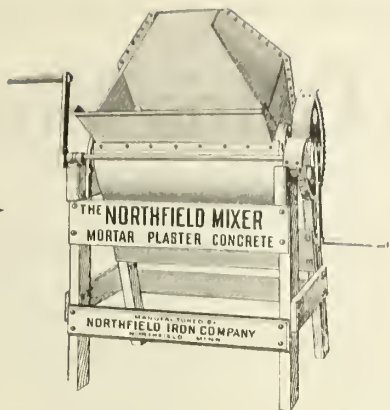
A Book that rings true, strikes the nail squarely, treats the subject tersely, instructively, yet interestingly, is

“The Hydrolithic System”

You should have a copy. Free, postage paid, to your address.

The Good Products Co.

1705 West Austin Ave.,
Chicago, Ill.



The Simple, Little, Light, Handy and Substantial

NORTHFIELD MIXER

Will Save You Big Money on Every Job.

Conservative Capacity: 90 cu. yds. per day. It can always be set to discharge direct into forms, cutting out $\frac{1}{2}$ the wheelers. It saves you $\frac{3}{4}$ the transportation charges and all repair bills, as compared with any other mixer.

No man's business is so big, nor no job so small but what it will pay to have this little Money, Time and Worry Saver on the Work.

New Principle

Plows, Hoes, Stirs, Mixes Mortar, Plaster or Concrete. Insures a thorough mixture under all conditions. The only satisfactory color blending machine.

Is Not a Man-killer

Operates by either Engine, Motor or Hand Power. Most Reasonable Priced Good Mixer on the Market. Sold on Trial—Satisfaction Guaranteed. Write at once for FREE Catalogue, Prices and Terms.

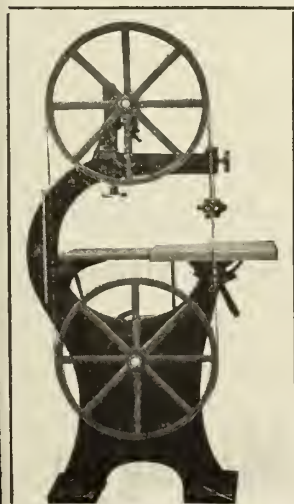
MANUFACTURED BY

NORTHFIELD IRON COMPANY

406 Water Street, - - - NORTHFIELD, MINN.

This Crescent Band Saw Makes \$1,000 a Year For One Concrete Block Man.

In the O. C. Barber concrete products factory, Barberton, O., a shop is maintained for making special wood patterns. A Crescent Band Saw was installed a year ago. Since then the pattern shop force has been cut down by one man and more and better work is being turned out. That means \$1,000 a year added to the profits.



[Saves One Man's Services

Whether you operate a concrete plant or do general construction work, you need wood-working machinery. It cuts your labor cost and produces better work. We have pattern-shop equipment and combination saw tables that may be moved from job to job. Get our catalog and see if you can't cut down your force by doing some of your own woodwork at a reasonable figure.

The Crescent Machine Co.

11 Columbia St.,
Leontonia, Ohio.

Driwal

ALL concrete and cement surfaces are best water-proofed and decorated by DRIWAL. It is proof against water, acid, alkali and weather.

You apply DRIWAL directly to the cement or concrete surface. No preparation of the surface is needed.

DRIWAL penetrates and fills up the pores without changing the texture of the surface and is equally effective for Cement, Concrete, Stucco, Stone, or Brick, old or new.

Black DRIWAL for foundations. White DRIWAL for mission exteriors and factory interiors. Transparent DRIWAL for waterproofing without changing color. Fourteen beautiful flat tints in Colored DRIWAL for artistic effects.

Write for Illustrated Booklet on Methods and Costs of Concrete Waterproofing and Decorating. It contains a chart of the DRIWAL colors.

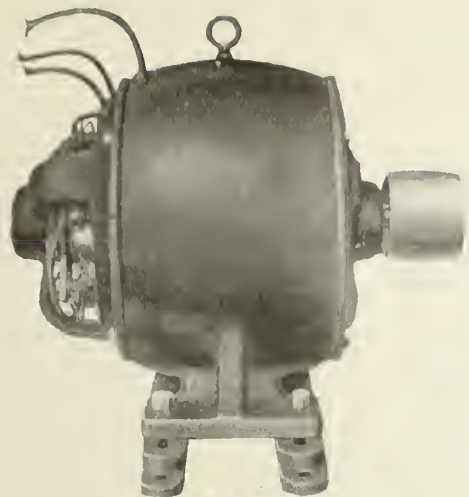
BILCHACO Cement Floor Coating, six colors, saves and protects cement floors.

Booth 63 at Chicago Cement Show

The Billings-Chapin Co.

Boston Cleveland New York
BILLINGS, KING & CO., Eastern Dept.

Driwal



**Stop
fussing
with a
balky
engine**

No matter what branch of the concrete business you're in, if your business grows you can increase your profits by operating some of your machines by power. The big item on every cost sheet is "labor."

If your business stands still, you can do without power. But the concrete contractors and the concrete products manufacturers who are building up big business, operate their equipment with power.

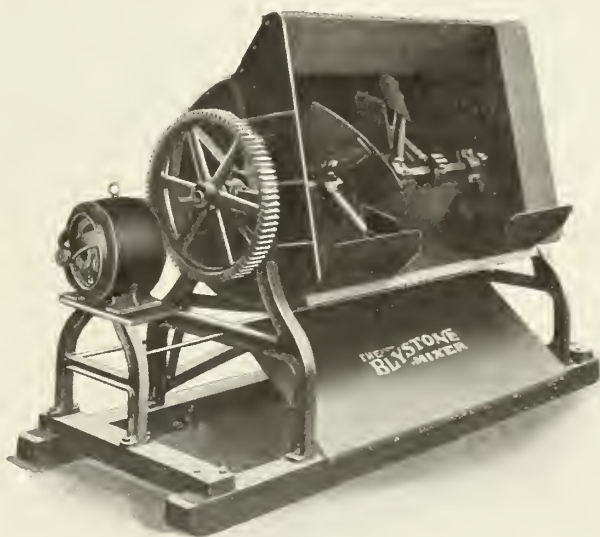
You may have used some unsatisfactory engine—you may have had to keep a man standing over it to keep its courage up. You don't have to do that with a Sterling motor. Start it and then leave it alone.

You can buy a small motor and attach it direct to your tile machine or your mixer. Or, if you have a number of machines requiring power, set up a larger motor at a central point and feed power to the various machines by belt and shaft.

We have made a study of the power requirements of the average concrete contractor or plant owner. We can help you cut your cost of production and increase your output—those things mean a substantial increase in profits. The investment required to bring this about is small. Ask us about it.

Absolutely the cheapest power for this mixer or any other concrete ma- chine is furnished by a Sterling Electric Motor

When we say cheapest, we don't mean that Sterling motors are make-shifts. They deliver the cheapest power because they deliver the power when you want it. No uncertainty. No vexing delays. Sterling motors run right along after you turn the switch—they don't have to be coaxed. They don't cough, spit, balk, kick or die. They're on the job every minute.



Sterling Motor running a Blystone Batch Mixer

Let Us Help You Solve Your Power Problems

Tell us just what power each of your machines requires. Tell the make of each machine. Send a rough sketch of their arrangement. We'll figure out the cheapest way of supplying power and advise just how large a motor you need. You'll have the whole proposition in a nutshell and you can tell in five minutes whether or not you want to make this season a bumper profit season by running your machines with one or more Sterling motors.

THE OHIO STERLING COMPANY

Manufacturers of electric motors for concrete machinery.

DAYTON, OHIO

In writing Advertisers please mention CONCRETE.

There's a Uniformity About Koehring Mixing No Other Mixer Equals

There are three continuous, independent opposed mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

And the important feature is that the actions, being independent and opposed to one another, there is an intermingling of the entire mass of material contained in the drum.

You will mix concrete in the shortest time because the Koehring Mixer has three independent mixing actions.

You will get it out of the drum quickest because the Koehring Mixer has the most rapid discharge. You will run continuously because the Koehring mixer is built better and stronger than others.



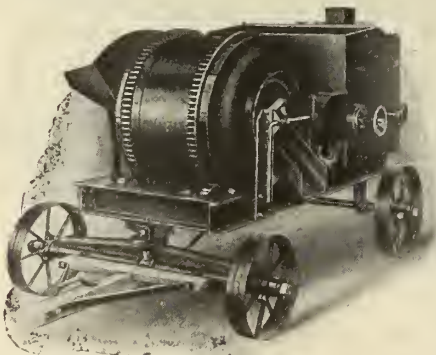
There are equally important advantages in the mechanical construction of the Koehring Mixer:

The heavy cast special metal Koehring drum will outlast the drum of any other mixer.

The trunnion rollers are keyed on to the axles and rotate as a unit precisely in the same manner as a railroad truck, making impossible "wobbly" drums and rollers.

The charging bucket raises to nearly vertical position, enabling all material to pass into drum without pounding the bucket.

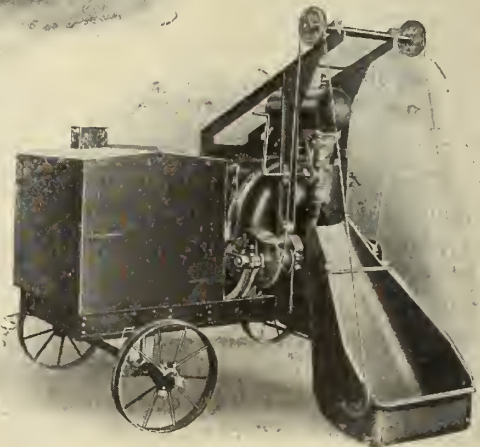
Study any other detail of the Koehring Mixer and you will find the same dollar-saving quality.



A Small Koehring Mixer, Equipped with Standard Hopper Showing House over Gasoline Engine.

To facilitate the mixing and placing of concrete in Silo Forms, we have designed a small Mixer with Hoisting Drum, and a suitable Concrete Elevator for hoisting the concrete from the Mixer.

Your copy of our new 1912 Catalog is awaiting your request for it. Better write at once.



Koehring Mixer Equipped with Side Loader and Water Measuring Tank.

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Carolina Portland Cement Co.,
Charleston, S. C.

P. H. Linz,
44 Byrd Bldg.,
Memphis, Tenn.



Trinity Methodist Church, Lincoln, Neb., built of white and granite faced brick. One Peerless Machine made them faster than the workmen could lay them. Brick made by Lincoln Stone & Supply Co.

The above is an example of the work that the Peerless is doing every day. In quality of product the

Peerless Brick Machine

Has No Equal

The Peerless is made of high grade carbon steel and heavy malleable iron; it can't spring out of alignment as will sheet steel and angle iron, and will outlive its owner.

We guarantee its construction in the following unparalleled guarantee: If machine is broken or injured in operation we will replace any broken or injured part free of charge as long as machine is in the hands of the original purchaser. Will others do this?

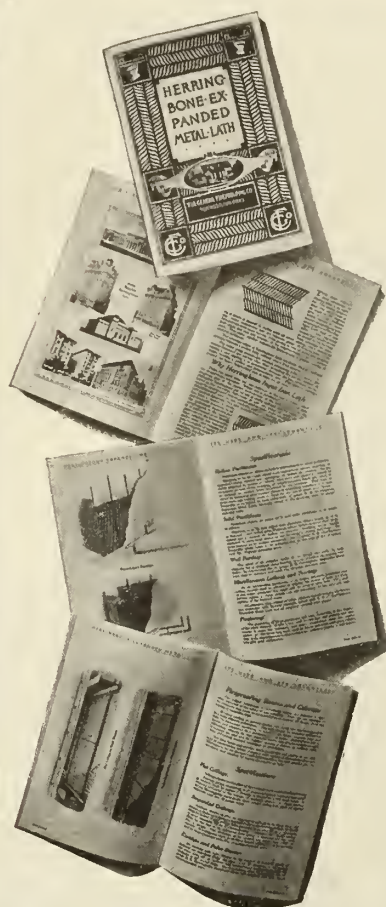
Cement is at the lowest price ever known. Buy the machine that will make money for you. Write for catalogue and booklet on cement brick.

Peerless Brick Machine Co.

9 North Sixth St., Minneapolis, Minn.

**Capacity
12000
per day**





A Book on Fireproof Construction

dealing from a practical standpoint with the fireproofing problems met in everyday practice.

A carefully prepared treatise on metal lath construction in all its various forms, so arranged and classified as to be of the most assistance to the busy Architect and Engineer.

Complete with typical drawings, detailed specifications, photographs and general information regarding the use of metal lath.

Your request will bring this booklet to your desk by return mail.

Better write now.

The General Fireproofing Co.
P. O. Box 106 Youngstown, Ohio



A Happy New Year to Everybody

I'm The Bay State Coating Man

My goods are backed by twelve years of practical experience in making a cement coating. They have been tried under all sorts of conditions and met all the requirements.

Years before anyone had put a coating on the market BAY STATE BRICK AND CEMENT COATING was an established success. It had been used on large and small houses, factory walls and factory floors, on the vats and damp rooms of textile mills and breweries. It is the only coating that I know of that won't burn when subjected to heat. It has a flat finish, doesn't destroy the texture of concrete and saves it from cracking from moisture.

Just write me for our Booklet No. 12.

Give our salesman a good hearing when he calls. He's got the goods.

Wadsworth, Howland & Co., Inc.,
Paint and Varnish Makers and Lead Corrodors
82-84 Washington Street, Boston, Mass.

The ROSS Concrete Spade

For Finishing
Piers, Walls, Abutments, Etc.
**A Great Time, Labor,
Money Saver!**

Costs but \$2.50 (discount in lots of 1/2 doz. or more) but saves the contractor dollars daily. Every day you fail to use this spade you lose some cold cash. Scores of contractors testify to this. When used in finishing walls while the concrete is wet in the forms, it forces the heavy particles back and brings the mortar to the surface—thus making a complete job with one operation.

The Ross Concrete Spade is also now made without offset for re-enforced concrete work with either short or long handle at same price. Specify kind wanted when ordering.

Ross Concrete Spade No. 1 (Regular) D handle with offset.

Ross Concrete Spade No. 2 D handle without offset.

Ross Concrete Spade No. 3 Long D handle without offset.

Send us \$2.50 today for sample spade or more facts. Use coupon attached.

HAROLD L. BOND COMPANY

391 F Atlantic Ave., Boston, Mass.
Sole Export Agents.
The (U. K.) Winget Concrete Machine Co., Ltd.,
9 Star Buildings,
Newcastle-on-Tyne, England.

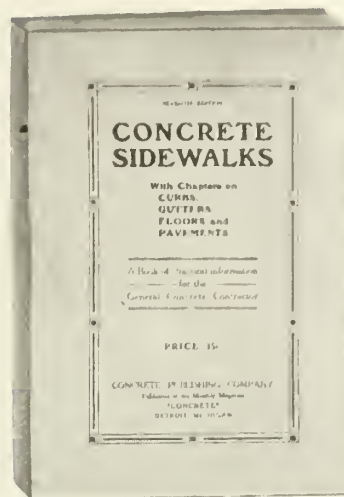
Harold L. Bond Company,
391 F Atlantic Ave., Boston, Mass.
Please send me full details about the Ross Concrete Spade.

Name
Address





Buy authoritative books. To have the written experiences of experts at your elbow is to possess an asset indispensable in the successful conduct of a business or a profession.



Reinforced Concrete

By Webb and Gibson. A clear, concise book on this subject, treating, in detail, cement and cement testing, mixing and measuring concrete, depositing and finishing, general theory of reinforced concrete and its structural applications. Cloth Bound, Post Paid, \$1.00.

Concrete Sidewalks

By the Editors of CONCRETE. This is the seventh edition of a work which established itself as authority with sidewalk contractors. Old methods of sidewalk building are not the methods which are now most successful nor the most profitable. This is a book of the best practice and contains in addition to sidewalk specifications, chapters on curb and gutter, floor and pavement construction. It contains 64 pages, 5" x 8" (goes in the pocket); is bound substantially in heavy paper and sells for 35 cents postpaid.

Strength of Materials

By Edward R. Maurer. A standard work on the subject. Contains chapters on simple stress, reactions of supports, strength of beams, strength of columns, strength of shafts, riveted joints, etc. Includes valuable formulae and test readings. Cloth Bound, Post Paid, \$1.00.

Highway Construction

By Phillips and Byrne. The latest methods and materials discussed. Consideration given to country road building, city street paving, stone-block pavements, brick and wood streets, asphalts, curb and gutter construction, etc. Cloth Bound; Post Paid, \$1.00.

Cement Tile

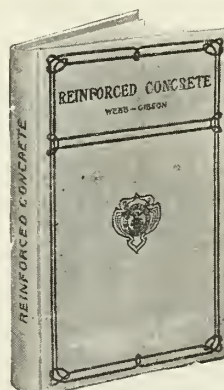
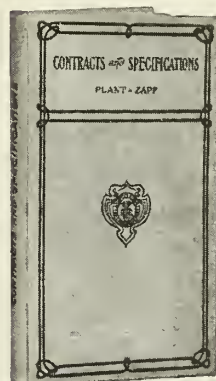
By the Editors of CONCRETE. This pocket-size volume contains a vast amount of information of value to the man who makes the tile, the man who sells it and the man who lays it. It is a book of practical instruction in its third edition. It contains 64 pages, 5 x 7½", with 42 pages of text; is substantially bound in heavy paper and is sent postpaid for 25 cents.

Contracts and Specifications

By Plant and Zapf. A book that fills a niche in every engineer's and architect's library, and is helpful to the contractor as well. Standard requirements in material and work, outline of residence specifications, formal contracts, bonds, etc. Cloth Bound, Post Paid, \$1.00.

Masonry Construction

By Phillips and Byrne. A handy volume for engineer, architect and contractor. The authors write on structural materials, general foundation work, stone masonry and brickwork, masonry structures, and use of concrete in mass. Cloth Bound, Post Paid, \$1.00.

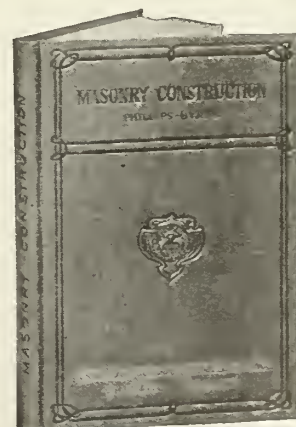
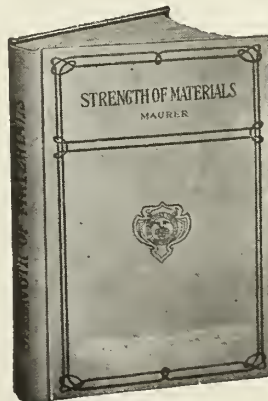
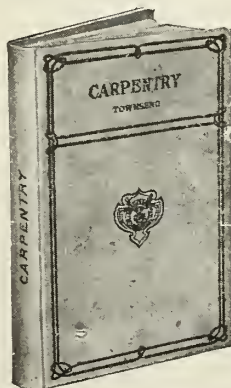
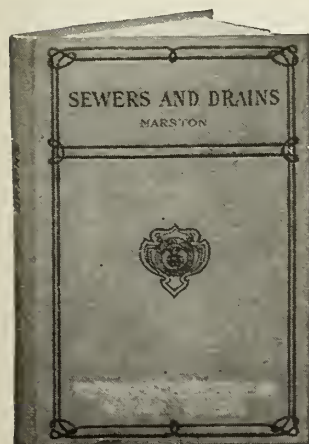


Sewers and Drains

By A. Marston. The author's name alone gives authority to this work. He takes up the general features of sewerage systems, sewer calculation and design, land construction and sewage disposal. Cloth Bound, Post Paid, \$1.00.

Concrete Publishing Co., Book Department

Detroit, Michigan.



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1121 THE ROOKERY
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50 WEST STREET.
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on

CEMENT

ROBERT W. HUNT JNO. J. CONE JAS. C. HALLSTED D. W. McNAUGHER

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BUREAU OF INSPECTION, TESTS AND CONSULTATION

CEMENT INSPECTION

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Physical and Chemical Tests of All Kinds

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Steel Forms for Sidewalk and Curb and Gutter Work

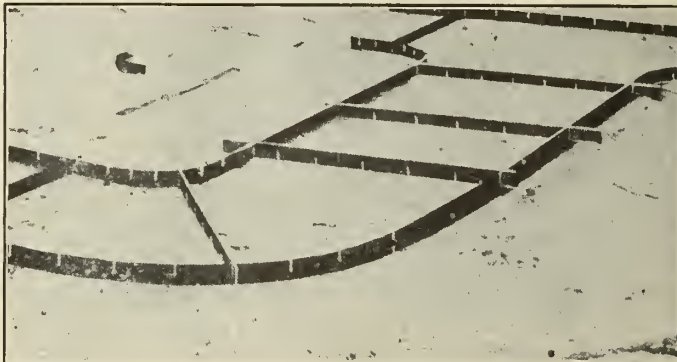
ONLY form on market Adjustable to all Widths of Sidewalk

Contractors using the Ubbink Adjustable Forms are saving 100% of their lumber expenses, 20% of their labor costs and save 2c per square foot on all sidewalks.

Ubbink system is the only ADJUSTABLE Form on the market with which all widths of walk can be made with same set. Flexible side-pieces will make all curves.

Ubbink Steel Form Co.

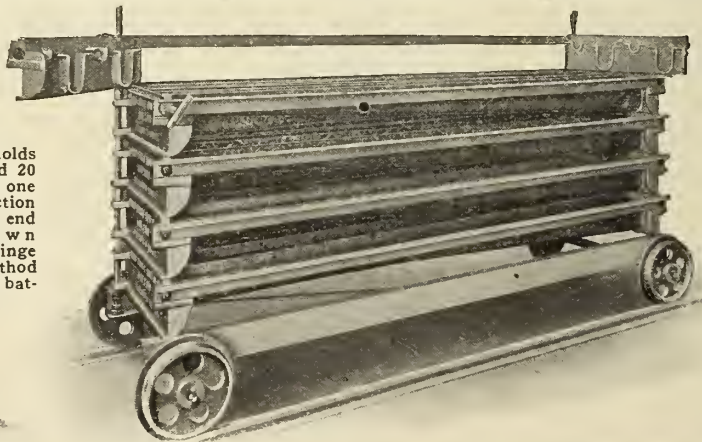
214-216 Pier St., Port Washington, Wis.



OUR PROPOSITION

Order an outfit, use it 10 days. Abuse it in any way and after using 10 days and it doesn't prove to be superior to all other makes, pack and return at our expense.

Get our new Hand Book written by the most experienced sidewalk man in the country. Every contractor should have this book, as it contains very valuable information relative to sidewalk and curb and gutter construction.



Batteries of molds making 30 and 20 wet posts at one time. Top section emptied and end frames thrown back on hinge showing method of emptying battery.

CONCRETE FENCE POSTS

T-Shape makes them

Strongest--Lightest -- Cheapest

Our molds and posts are used all over the world. Used by leading U. S. railroads and interurbans. We guarantee our molds absolutely. See our exhibits at the New York, Chicago and Kansas City Cement Shows.

Will exhibit at the Cement Show held in New York, January 29, February 3; Chicago, February 21-28; Kansas City, March 14-21.

OHIO POST MOLD CO.

1341 Nicholas Bldg., Toledo, O.
Write for our catalog.

The Reliance Pulverizer

Capacity 2-6 Tons per hour

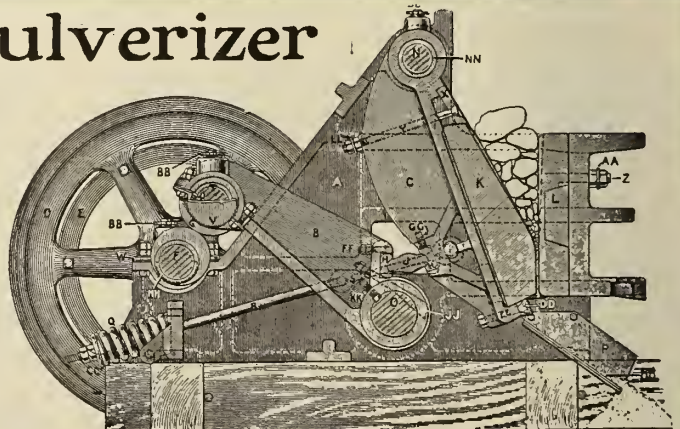
A machine that will reduce raw material to a product ranging from :

$\frac{1}{4}$ " size to DUST
at ONE OPERATION

Write for Circular.

Universal Road Machinery Co.
KINGSTON, N. Y.

BRANCH OFFICES: Boston, Rochester, New York





A Superior Glass for Sidewalk Lights

We have recently completed very thorough and exhaustive tests on glass for use in vault and sidewalk light construction.

The object has been to obtain glass of high lustre, toughness and absolute uniformity. We are now pleased to announce that results obtained have unquestionably indicated the proper ware—"TANEX."

This we have adopted to use in all our lights because it is an absolutely uniform glass of unusual brilliancy, toughness, and strength, giving results far superior to any other.

See that the "TANEX" trade mark is on the glass that you install.

Write the nearest Berger Branch for a catalogue of "Raydiant" Sidewalk and Vault Lights.

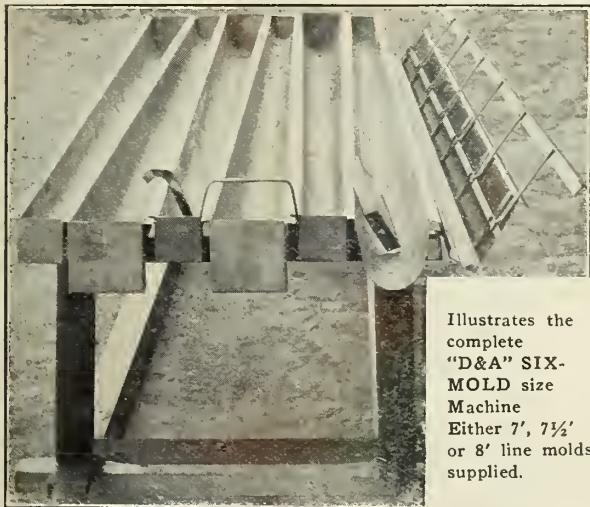
The Berger Mfg. Co.

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Address our
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Illustrates the complete "D&A" SIX-MOLD size Machine Either 7', 7½' or 8' line molds supplied.

Before You Buy, Investigate

"D&A" Cement Post Machines

Make Six and Ten Posts at one time.

"D&A" MOLDS for all sizes and lengths of Line Posts, also Anchor and Brace posts and Pole Molds.

A profitable investment for any Cement Products Plant. One sack Cement, 1/6 yd. gravel, 12 lbs. steel and ¾ hour labor will make six posts, at a cost of less than 16c each.

"D&A" Molds are in use in all parts of the U. S. and many foreign countries. Eleven Ry. Co.'s., U. S. Dept. of Agr., and Dept. of War; leading Portland Cement Co.'s.

The "Shaking System" which makes them Wet (not slush), no pallets, no tamping. "D&A" Tie wires fasten fences securely and most cheaply.

10,000 "D&A" CEMENT FENCE POSTS

Manufactured by

D., L. & W. RY. CO. at BOONTON, N. J.

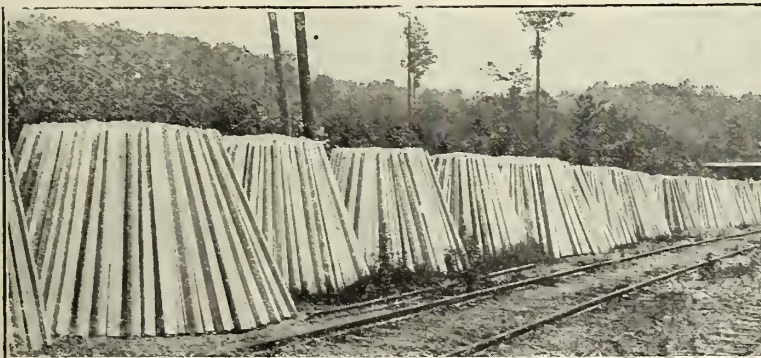
Strength, Durability and Low Cost are features of "D&A" POSTS, the "Shaking System." No tamping, no pallets or planks used.

Over 300 "D & A" Molds are used at this plant. More than 15,000 Posts made during 1911, being set along their lines in that vicinity. Posts are made at rock quarry, entirely from crushed rock, and are as white as snow and as smooth as paper.

1912 Catalogue Free, explaining "D & A" Post Machines in detail. Prices and Discounts upon request. See our exhibits at the Cement Shows.

D. & A. POST MOLD CO.

212 Third Ave., Three Rivers, Mich., U. S. A.



8 Interesting Letters

Kramer Automatic Tamper Co., Madison, Lake Co., Ohio, Nov. 17th, 1911
Peoria, Ills.

1. Gentlemen:—
Replying to your favor of the 3rd Inst., in regards to the working of the Tamper you sold me last Spring, I will give you a few of the remarks I hear everywhere I go in regards to my blocks, which I never heard before I got the Tamper. One man said he would sooner have my 8x8x16" blocks than any 8x10x16" hand tamped block made. Here is the last order I got. This is the way I received it. A gentleman came to my shop November 4th, and stood and looked at the Tamper running, while I was cleaning up. I told him I would be through in a few minutes. He said he just wanted to see it run, was all. He asked me what I wanted for my blocks. I told him and he said, get me out 1500 soon as you can, and he is hauling them now. They ask me why I don't keep them on hand. I have given that up since I put the Tamper in. The only way I could get any ahead would be to sell the Tamper, and then I would get a yard full.
I have now at present, orders to make yet this fall 2500 blocks.
Sorry to say that I could not get you a photo of my place. I have built another large building, 30x60.
I should advise any block manufacturer to have a Kramer Tamper installed, as mine has paid for itself this season.
Now I have not told you how many you could make, as that depends on what kind of help you got. We have made 90 in one hour, and have made 3 in 1 1/4 minutes. If you want to know anything about the repairs, you can find it is not very much. The cost to me was only \$6.00.
Hoping this will be satisfactory, as I could talk Tamper day and night.
I will answer any letters, stamps enclosed.

Respectfully yours,
CHAS. S. ELDRIDGE.

Kramer Automatic Tamper Co., Waterville, Maine, Nov. 10th, 1911.
Peoria, Ills.

2. Gentlemen:—
After using your Automatic Tamper nearly two years, making Miracle Double Air Space Blocks, I have only words of commendation for the work the machine does. Blocks can be made faster, and much easier and of better quality, than by hand tamping.
Yours truly,
EMERY HILL CON. CO.,
Edwin Towne, Treas.

Kramer Automatic Tamper Co., Hampton, Iowa, Nov. 14th, 1911.
Peoria, Ills.

3. Gentlemen:—
The automatic Tamper that I bought of you last Spring at the Chicago Cement Show has given the best of satisfaction, both as to quality and quantity of blocks produced.
As to the quality, the machine tamped blocks weigh about ten per cent more than the hand tamped, proving that the machine tamped blocks must be more dense.
I use facing on all blocks, and make the concrete wet enough so that the water shows on the outside of the blocks when removed from the machine.
I consider the tamper will double the output of a crew of two, three or four men. As to speed, four men have made five 8x8x24" with facing and carried them away to cure in five minutes and twenty seconds.

Yours truly,
G. E. SARGENT.

Kramer Automatic Tamper Co., Cleveland, Ohio, Dec. 12th, 1911.
Peoria, Ill.

4. Gentlemen:—
In regards to your letter of the 7th Inst., on the merits of your Tamper installed in my shop, I must say I have seen several different kinds of tampers, but have not seen any which I would trade mine for. I installed it about 18 months ago, and have had very little trouble with it.
I would not part with it for \$500 if I could not get another one. No block maker can afford to be without one, because it makes a much better block than you can make by hand.

Yours truly,
H. P. BENNETT.

Kramer Automatic Tamper Co., Lafayette, Ind., Nov. 17th, 1911.
Peoria, Ills.

5. Gentlemen:—
After having used "The Kramer Automatic Tamper" in connection with the making of all cement blocks, we are pleased to report that it has proven satisfactory in every respect, and we are well satisfied in every respect with the results obtained.
Heretofore it was practically impossible to produce and market blocks as we wished, but since the installation of your Tamper, all the "hand tamped" defects have been eliminated, which has created a demand for "Kramer Automatic Tamped Blocks."
Owing to the simplicity of the "Kramer Automatic Tamper," it very seldom needs attention, and as yet, after good hard usage, has not inconvenienced us in the least.
We will be glad to recommend the Kramer Automatic Tamper to any one, at any time, so do not hesitate to use us.

Yours very truly,
HENRY J. KESSENER LBR. CO.,
Will D. Kessener, Treas.

Kramer Automatic Tamper Co., Lincoln, Nebr., Nov. 16th, 1911.
Peoria, Ills.

6. Gentlemen:—
In answer to your favor of the 4th Inst., will say that we have had in use a Kramer Automatic Tamper, which has given perfect satisfaction.
The tamper, unlike men, never tires, and as it is easily operated, the men can work fast the entire day. In our shop with three men who do their own mixing, we turn out daily eight hundred linear feet of stone.
Thanking you for this opportunity to make public our approval of the Kramer Automatic Tamper, we are,

Very truly,
THE REIMERS KAUFMAN CO.

Kramer Automatic Tamper Co., Valley City, N. D., Dec. 11th, 1911.
Peoria, Ills.

7. Gentlemen:—
Regarding your letter of the 8th Inst., I will say that your Tamper has given me good service. I have run it two years now without any extra expense but a new chain.
Since I have installed your Tamper I find I can make 200 more blocks in ten hours, and besides, I can use them a good deal sooner, and find that I have a good deal better results. The Tamper puts more material in them than can be done by hand. And I have a good deal better sales and twice the satisfaction.

Yours most truly,
W. J. CURREN.

Kramer Automatic Tamper Co., Waterloo, Iowa, Nov. 15th, 1911.
Peoria, Ills.

8. Gentlemen:—
Replying to yours of the 4th Inst., in which you ask how we like the Kramer Tamper we have used the Kramer Tamper for four years, in our Block Plant at Waterloo, and our experience with the machine has caused us to name it the "Dividend Payer."
Having tamped blocks by hand for a period of five years previous to installing the Tamper, we are in position to know the difference in labor cost for producing the blocks. The Kramer Tamper reduces this cost fully 50 per cent.
The quality of the blocks made by the Tamper is fully thirty-three and a third better by reason of the fact that the block maker can use a wetter concrete and can pack so much denser. We find our blocks are practically waterproof. We cannot get along without the Kramer Tamper. Wishing you unbounded success, we remain,
Yours truly,

CONCRETE STONE CO.
H. L. Green, Mgr.

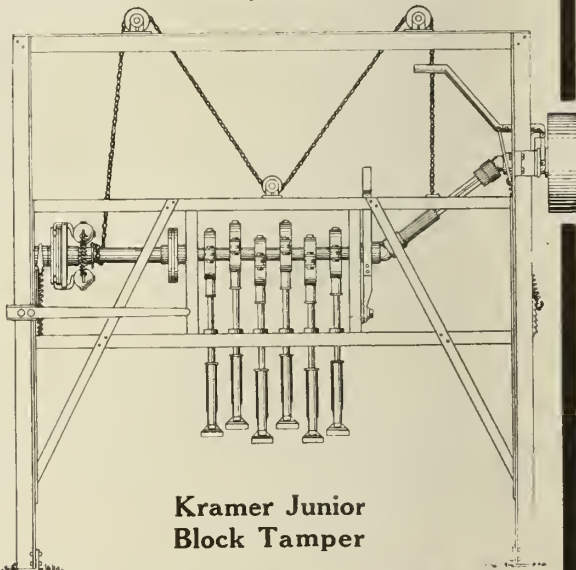
Kramer Automatic Tampers

THE KRAMER JUNIOR BLOCK TAMPER is built of steel and is a great achievement for simplicity, and durability. The tampers are mounted on springs, making the stroke an elastic one. These springs also act as a shock absorber, which enables the lightest and frailest kind of a block machine to withstand the terrific tamping exerted by it, without wrecking the mold box.

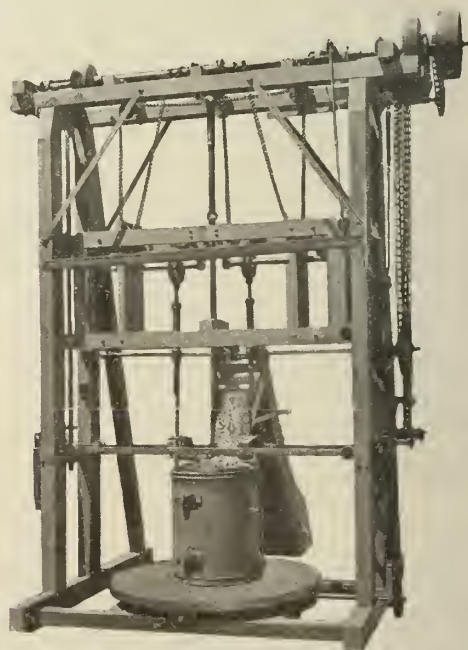
It will successfully work on any size or style block machine. It will increase the output of your plant over 100 per cent, and reduce the cost fully 50 per cent.

The correctness of our statement is vouched for by hundreds of satisfied users.

See our Tampers at Space 162, New York Cement Show.



Kramer Junior Block Tamper



The Kramer Tile Tamper.

A real machine for making large Sewer and Drain Tile. It has two tampers striking 600 blows per minute; it will tamp Tile to any density, does not require any pallets for either drain or sewer Tile. Let us tell you all about these machines. Write today.

Kramer Automatic Tamper Co.

491 S. Adams Street - - PEORIA, ILL.



BRONZE FINISHING TOOLS

We have at last succeeded in placing on the market a BRONZE line of sidewalk tools which are sure to meet with approval from all sidewalk men. The workmanship and quality of the tools cannot be excelled and they are fully guaranteed in every respect. Write for catalog.

In addition to the bronze line we handle and make a full line of malleable iron finishing tools, concrete mixer, block machine, brick machine, steel sidewalk forms, post molds, pipe and tile molds, tile machines, fancy molds and many other machines for concrete work.

Catalog of full line FREE on request.

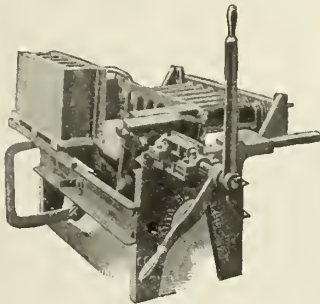
Arrowsmith Concrete Tool Co., Dept. C-2 Arrowsmith, Ill

HAYDEN CONCRETE BLOCK MACHINERY

repair parts, or want to add a second machine to your equipment. Our line is large. booklets describing those machines.

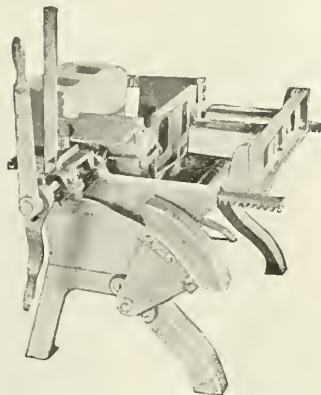
Our line of machinery today represents the best ideas for mixing and molding concrete into building units. When you buy a Hayden machine you buy of an old established company, one that you know is going to be in business in case you want

Tell us just what machines you are interested in and we'll send



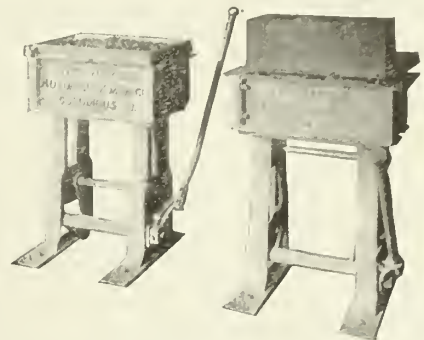
The New Hayden 24 in. Down-Face Machine

This new Hayden 24 in. Down-Face Machine makes blocks any thickness of wall from 4 in. to 16 in., any height of block from 4 in. to 12 in., any length from 2 in. to 24 in. Blocks all styles of faces in straight, angle and circle work. Write for circular.



Hayden Automatic Down-Face Block Machine

Made in the following sizes: 16, 18, 20, 24, 32 and 36 inch. Built on correct principles--one of the oldest face-down block machines on the market. It has been kept right up to the minute with modern improvements.



Hayden Stripper--For Plain Face Block

The Hayden Stripper is used in turning out standard blocks of plain design, for stucco walls, foundations, etc. It pays for itself quickly. You don't have to operate an expensive machine on a low-priced product--make your plain block on the Stripper. Wet mix may be used.

Any Pallet Will Fit Them: We build these machines to fit any pallet no matter what size or make, at no extra cost to you.



Concrete Mixers

Highest grade concrete mixers.

Write us before buying.



Block Maker's Trowel

Only trowel on the market designed specially for the block maker. Blade of the best saw steel, highly tempered and polished, with edges slightly rounded. Size 12 in. long, 5 in. wide. Very durable; brass handle; adjustable so worn blade may be replaced by a new one.

SEE US AT
New York-spaces 190-191
Chicago " 212-213
Kansas City " 52-53



Ornamental Molds

You can order molds for a few ornamental pieces--pedestals, columns, caps, etc.--and as the demand increases for product, add to your line. Ask about our adjustable Angle Molds, adjustable Sill & Lintel Molds, etc.

HAYDEN AUTOMATIC BLOCK MACHINE COMPANY

112 West Columbus, Ohio
Broad St.,



Let Us Drop a Dollar In Your Pocket

We are going to make this a banner year for the Johnson vault mold. Let us tell you about it--let us show you how you can make money with this mold, with a small investment.

Johnson Vault Mold Co.

Greenfield, Ind.
Eastern States

Topeka, Kans.
Western States

Combine Our Agency With Your Business

THERE'S money in it for you Builders, Carpenters, Roofers and others connected with the building trades are learning this every day. You will be sure of a pleased customer and repeat orders when you recommend MONTROSS METAL SHINGLES. Storm, lightning and fire proof. Cheapest and most economical roofing made. Will last as long as building. Easy to lay—no soldering. Big margin of profit. One roofing job will convince you.

Our proposition to agents best ever. Send for illustrated catalog, price-list, testimonials, etc.

Exclusive
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Given

MONTROSS METAL SHINGLE COMPANY

104 Erie St., Camden, N. J.

MONTROSS METAL SHINGLES

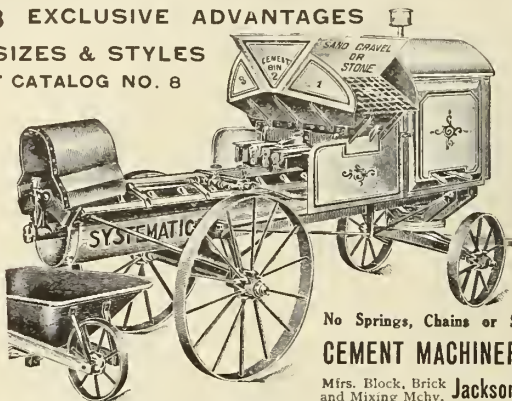


SYSTEMATIC CONCRETE MIXERS

28 EXCLUSIVE ADVANTAGES

6 SIZES & STYLES

GET CATALOG NO. 8



No Springs, Chains or Sprockets

CEMENT MACHINERY CO.

Mfrs. Block, Brick and Mixing Mchys. Jackson, Mich.

CEMENTS AND CONCRETE ROAD AND PAVING MATERIALS

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Rocks, Clays, Bricks, Blocks, Asphalts, Oils, Tars, Emulsions and all types of Bituminous Materials.

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BUSINESS MEN FAMILIES TOURISTS
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Within Five Minutes' Walk of Theatres, Shops and Clubs. 300 Feet West of Broadway.
New Dutch Grill Rooms. Largest in the City. Electric Cars pass Hotel to all Railroads.

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\$1.50 per Day **\$2.00 per Day**
WITHOUT BATH **WITH BATH**
Suites, \$3.50 and upwards

SEND FOR COLORED MAP OF NEW YORK

EDGAR T. SMITH, Managing Director

Plaza Hotel, Chicago, under same management.

Last Month

We suggested that you look over the fence. Did you do so? Our world is now thirty days older, many changes have taken place. Thousands of quitters have thrown up the fight. Why? They were on the wrong side of the fence.

Your problem is to face out and march forward—if you hold back you will stay back.

Success is like a cork life preserver—if you make use of it you will stay on top. Our molds are not cork, but they are corks. They will assist you to reach the top, and stay there, in this concrete proposition.

Artistic designs, like cut, plus our locking and squaring device, constitute molds that will render "Service"—service that spells success.

Parties desirous of producing products which will command admiration should send for our catalog, showing many artistic designs.

Architectural Mold Company

1117 E. Warren Ave.,
Detroit, Mich.

H. W. REMINGTON
19 South St.,
New York,
Eastern and Foreign
Representative.



GENUINE BANGOR

Roofing Slate, Structural Slate, Blackboards

EAST BANGOR CONSOLIDATED SLATE CO.

EAST BANGOR, PA.

Large Facilities

Prompt Deliveries

Northwestern Modern Concrete Machinery

The entire line is shown in books now ready for distribution

These 1912 catalogs contain the entire line of NORTHWESTERN CONCRETE MACHINERY, including Mixing Machines, Block Machines, Moulds, and Tools, with beautiful half-tone illustrations taken from actual photographs and complete detailed description of everything in concrete machinery. These catalogs are encyclopedias of what you ought to have and at the prices you ought to pay. They are extremely valuable as a guide and reference whether you buy machinery or not, and anyone interested in concrete in any way should have copies of these publications.

Special Northwestern Concrete Mixer Catalog

Our Special mixer catalog contains a complete line of mixing machines of every size and description from the smallest type of hand mixers up to the largest power mixing machines made. This catalog shows a complete new line of Rotary Drum Mixers built in all sizes, from 7 ft. up, with combination of features that are the most attractive ever included in mixing machines. Special Sidewalk Mixers, Continuous Mixers, Block Plant Mixers and Hand Mixing Machines are shown, fully described and beautifully illustrated, many full page pictures showing exactly the details of construction. Be sure and write for this book.

Wholesale Prices

Block Machines, \$10 to \$250.

Brick Machines, \$22 to \$75.

Mixers, \$24 to \$1,000.

Porch Column and Baluster Outfits, \$15 to \$75.

Cap and Sill Moulds, \$12 to \$35.

Lawn Vases, \$15 to \$25.

Grave Stone Moulds, \$7 to \$69.

Well Curbing Moulds, \$4 to \$7.

Drain and Sewer Tile Moulds, \$6 to \$83.

Ball Moulds, \$2 to \$17.

Block Cars, \$11 to \$17.

Fence Post Moulds, \$7 to \$12.

Silo Moulds, \$14 to \$150.

Coping Moulds, \$18.

Hitching Post Moulds, \$20.

Baluster Moulds, \$6 to \$18.

Jardinières, \$12.

Special Gate Post Moulds, \$10 to \$30.

Newel Post Moulds, \$14.

Grave Markers, \$7.

Burial Vaults, \$90.

Complete Line of Cinder Crushers, Rock Crushers, Sand and Gravel Elevators, Sand Screens in both Revolving and Stationary Type, Mortar Gauges, Wheel-barrows, Jointers, Groovers, Edgers, Corner Tools, Curb and Gutter Tools, Corrugating and Radius Tools, Roller Jointers, Brick Tongs, Curb Clamps, Curbing Edgers, Hawks, Floats, Line and Indentation Rollers, Tampers, Rammers, Name Stamps, Indentation Letters, Wall Plugs, Expanded Metal and Water Proofing, Flower Pots, etc.

We can save everyone from 10 to 50 per cent on their purchase. We make no charge of fancy prices on account of patents, territory rights, etc.

We Make Quick Deliveries

We are distinctly manufacturers and operate the largest factory of its kind in existence. We own and operate our own Brass Shops, Foundries, Machine Shops, Pattern Works and build the entire line from start to finish, including gas-line engines. Large stocks are always carried on hand, enabling prompt shipment and quick delivery.

We are Concrete Machinery Experts

In addition to the NORTHWESTERN Line we manufacture the complete lines of several large concrete machinery concerns, and we are in the market for manufacturing propositions of this kind at any time. Owing to our immense manufacturing facilities, we are naturally in position to negotiate for large contracts because of our ability to turn out the goods at much lower cost than factories not so adequately equipped.

Our Guarantee

Every machine is sent out with the distinct understanding that if not entirely satisfactory it can be returned within ten days and not only the full purchase price refunded, but the return freight charge paid by us. Our immense business has been built up on the satisfaction of Northwestern Concrete Machines and our liberal trial offer, and they are now used in every civilized country in the world.

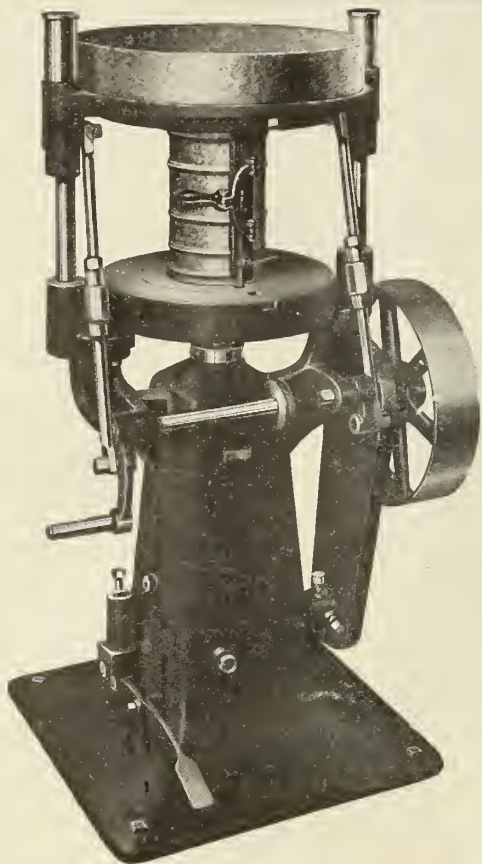


The Largest Factory in the World devoted to the manufacturing of Concrete Machinery.

Write for Wholesale Catalog
Any one or all catalogs sent on request.

We want everyone interested in concrete machinery to have copies of these catalogs. Send us your name and address and advise what particular machines or moulds interest you. It will pay you to get our prices before making your purchases.

Northwestern Steel & Iron Works, Spring St., Eau Claire, Wis.



Concrete Machinery

Shipped Direct
Absolutely On 15

Dunn Drain Tile Machine

You know a machine for making cement tile has to be heavy and solid, besides it must absolutely prevent sand and cement from getting into the working parts. The Dunn Machine has a wide, heavy dust-proof base or hood, cast in one big unit weighing 400 pounds. The simple, necessary machinery is enclosed in this cast iron frame perfectly protected from dust and sand.

It is low down, eliminating all vibration. No bolts to work loose, no shaft can get out of alignment. Compare its construction to others with the overhead wobbly frame bolted together on which are attached shafts and pulleys.

Our machine makes all sizes of tile from 3 to 12 inches and makes them perfect. One man with material mixed will turn out 1,000 tiles in eight hours; two men will double this output. You don't have to invest a large sum of money or require a large force of men with a Dunn Machine.

We sell direct to the user, saving all commissions. We don't even send experts to set up machine—none is required. And our fair and square selling method enables you to try our machine without risk. That's why we can sell this machine at this price.

Price Shipped on 15 Days Free Trial **\$175.00**

Wet Process Brick Machine

Makes a smooth, dense, waterproof brick. You first pour a wet mixture into the machine which flows over the pallet, covering it about one-half inch. It is then filled with ordinary dry concrete and tamped. This drier concrete when tamped absorbs the surplus water in the face or bottom, resulting in a smooth, hard, waterproof face on the brick when cured.

The bricks are cured on the pallets just as they are made. You know that a wet mixture makes the best brick. That's why the brick are not turned off the pallet.

It makes ten bricks at each operation. One man will make 1,500 bricks per day and every brick will be true with sharp, square corners and a hard, dense face. That's the kind of brick you want to make. Anyway that's the kind that sells at a good profit.

Price Shipped on 15 Days Free Trial **\$40.00**



Pour the Concrete

No tamping with this mold. You mix the concrete wet and pour it into the mold. The result is a dense, firm pipe that will ring when you strike it with a hammer—ring like metal. That's very important when the pipe will be used for sewers.

In case you want to make a dry-tamped pipe, you can do it just as easily. The stability of our core form and the positive action of the locking device on the outer shell insures a product of uniform shape and thickness.

The mold shown here makes 12-inch pipe—the best sewer pipe mold on the market. Ask for special pipe mold circular.

Price 15 Days Free Trial **\$7.50**



Cheapest to Travel the Shortest Road

We are manufacturers and sell direct to the user—from our factory to you. It's the best selling method for you and the cheapest buying method for you. It's the right way to save money, and our fair and square selling method enables you to try our machinery without risk.

Whether you are ready to order just now or not, we want you to have a copy of our big catalogue. Write for one right now, a postal will do.

Visit Us and See Machines Operating at the Cement Shows.

Chicago Booth No. 8
Kansas City Booth No. 8

W. E. DUNN

4134 Fillmore St.

For Every Purpose From Factory Day's Free Trial

Dunn Combination Block Machine

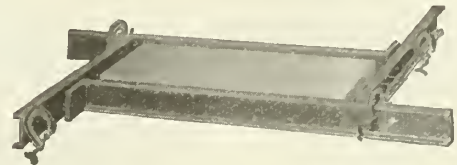
You won't find a simpler, better block machine anywhere. It makes blocks from a wet mixture because the newly made block is protected by the mold in turning and off-bearing. You know, this enables you to make a denser and more waterproof block than with the usual semi-dry method.

It makes blocks in widths of 8, 10 and 12 inches, all on the one size wood pallet. It makes veneer and two-piece wall blocks in widths of 2, 3 and 4 inches, two at one time.

You will find it a simple, practical machine at a common sense price, that will make all blocks used in ordinary building construction.



Price 15 Days Free Trial **\$40.00**



Price 15 Days Free Trial **\$15.00**

Adjustable Steel Cap Sill and Step Mold

Is so handy and practical that no cement block maker should be without one. It costs less than one made of wood. It is made entirely of steel and is adjustable from 2 to 72 inches in length and 2 to 24 inches in width.

It is especially adapted for making Caps, Sills and Steps. Besides it can be used for making almost any special work that you may have to make.



Price Complete
\$38.50 15 Days Free Trial

Ornamental Porch Molds

You can, with these molds, get contracts for Porches, Posts, and Chimneys at big profits. Our big catalogue shows several combinations of practical money making molds at prices that will astonish you.

This outfit makes this porch, also porch piers, posts, chimneys and a great variety of other work. You can buy the molds separately if desired at prices of \$3.50 and up.

Another Money Making Outfit

That will produce Porches, Piers and Posts that have become very popular with architects, contractors and homebuilders. Besides making the porch shown below, this outfit will make numerous other concrete products. You will always have the right size mold for any work.

Be sure and send for catalogue. It shows the different molds and many products that they will make.

Our 15 Day Free Trial Offer—How We Can Do It

We employ no agents or high salaried experts to start machines. We sell direct to the user, and make all our machines sell themselves.

Our big catalogue contains illustrations and descriptions of a score of good, reliable, modern machines—machines designed in our own plant. You can try any of them in your plant and then decide for yourself whether or not you want to keep them.

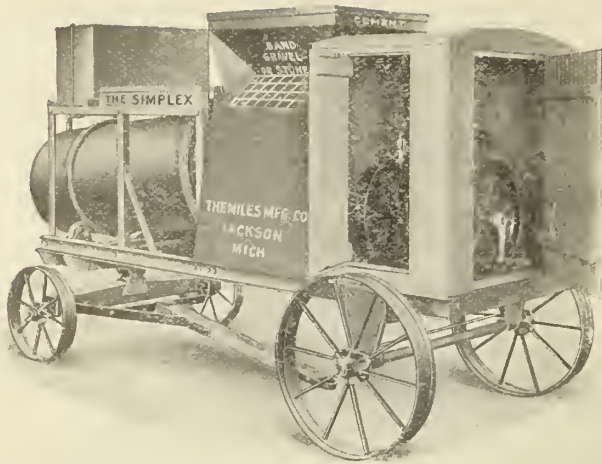
Isn't that a fair way of doing business—make the machines make good? Before you buy any concrete machinery, let us send you our catalogue and circular explaining our 15 Days' Free Trial Offer.

Price Complete
\$43.50

15 Days Free Trial



Manufacturing Co.,
Chicago, Ill.



The "Simplex" Improved Mixer

1912 MODEL

3 Hoppers, Continuous Feed, Rolling Mix, Low Down Steel Frame.
Strong, Simple, and Accurate.

"THE MILES"

No. 5, Face Down,
Wet Concrete Block Machine

Makes Stone

In Lengths, 4, 5, 8, 10, 12, 15,
18, 20, 22, 24 inches.

In Widths, 4, 6, 8, 10, 12
inches.

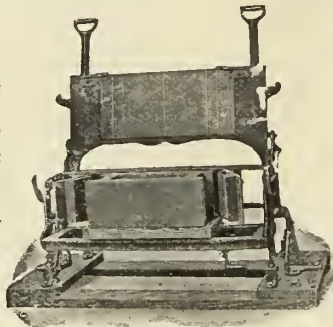
In Heights, 4, 6, 8 inches.
Also Angle Stone, Circle
Stone, Gable Stone, Hollow or
Solid Stone.

THE CONTRACTOR'S
FRIEND,

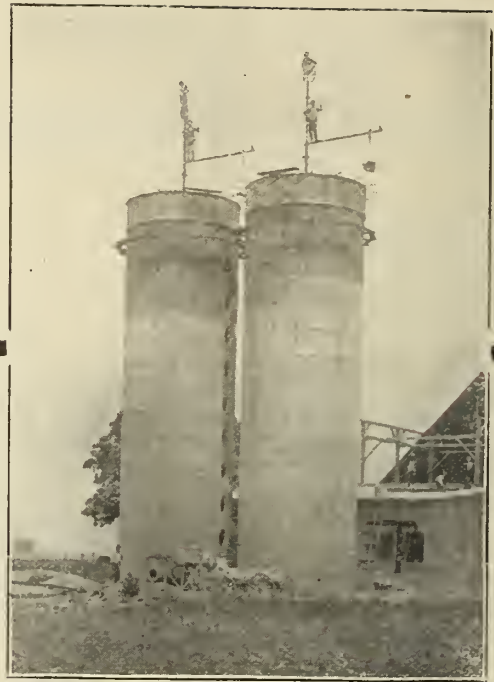
Simple, Strong and Rapid.

LOWEST IN PRICE.

Write for New 1912 Catalogue.



THE MILES MFG. CO., 315 E. Franklin Street
JACKSON, MICHIGAN



**JUST AS EASILY,
HIGH AS LOW.**

This is what the POLK SYSTEM (Pat.) guarantees in monolithic construction. The last fill goes in just as easily and almost as quickly as the first. Height cuts no figure--your structure will be just as straight as a plumb line, regardless of its dimensions, and it will be a REAL monolith when you use the POLK SYSTEM. NOW is the time to become familiar with and adopt the modern system--best for grain storages, stand pipes, silos, etc.

Write for particulars--Exhibit at Chicago Cement Show.

POLK-GENUNG-POLK CO.
FORT BRANCH, IND.

Big Money in Big Tile

NATIONAL Automatic Cement TILE MACHINE

**Makes Tile 14" to 36" in diameter or larger if desired
up to 48" in diam. 24" or 36" long**

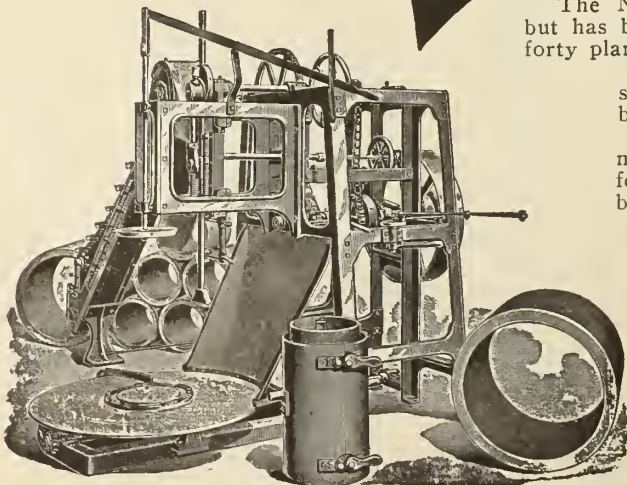
The NATIONAL CEMENT TILE MACHINE is no experiment but has been in actual use for over four years, and the thirty-five or forty plants will testify as to the efficiency of this machine.

The making of large tile is a part of your business, and you should go after the business, as it not only means large profits, but keeps your plant going almost every month in the year.

You can't afford to turn out poorly tamped tile, as it is ordinarily turned out by hand, when you can do from three to four times as much and turn out tile that is absolutely perfect by having one of our machines.

The National Machine tamps a tile absolutely dense, closing up all voids, and in ten days' curing will be water-tight.

Let us hear from you.



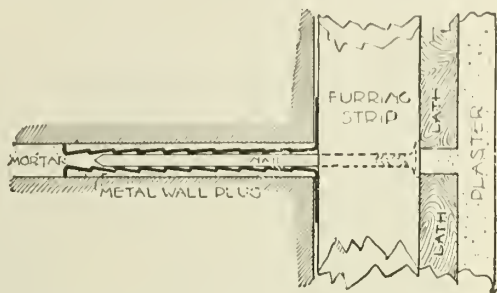
Quinn Wire and Iron Works

E. 12th Street

BOONE, IOWA

Just the 'Thing'

For
Securing Interior Finish



Furring Out on Brick or Concrete
Use the Standard

RUTTY METAL WALL PLUG

Send for Cement Booklet No. 94

J. B. Prescott & Son, Mfrs.

Dept. C

Agencies All Cities.

Webster, Mass.



Concrete Sidewalk Construction with
Berger's Pressed Steel Forms

**You Can Save Money on
Concrete Sidewalks**

WITH

**BERGER'S
PRESSED STEEL FORMS**

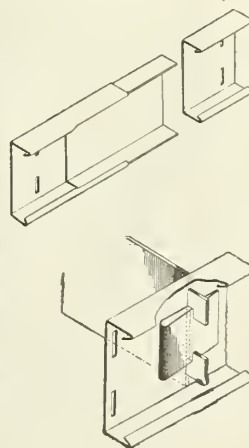
For Concrete Sidewalks

These forms contain all the features necessary for the successful, economical construction of concrete sidewalks.

Sliding lap joint and spring wedge hold them securely together. No projecting rivet heads to interfere with finishing tools.

No openings at side rail connections for concrete to seep through when tamping.

20% lighter than other metal forms of equal strength.

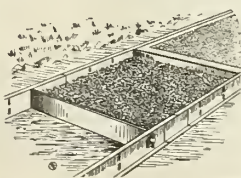


INCREASE THE EFFICIENCY OF YOUR WORKMEN

Get our Book "A"

The Berger Mfg. Co., Canton, O.

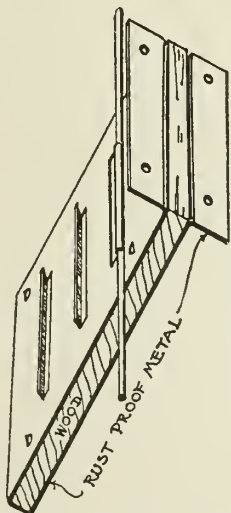
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Philadelphia Minneapolis
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**Distributors
Wanted**

"The Common Sense Wall Plug"

STANDING ON ITS MERIT



MERIT

ARE YOU A USER OR A LOSER?

SAMPLE FREE

THE M. O. WICKS MFG. CO.

48 NASSAU AVE.

GLEN COVE, N. Y.

The Curry Tyer



For
Binding
Reinforcing
Rods
in
Concrete
Construction

=====
Rapid
Secure
Uniform



This method of binding rods gives a uniform number of twists to the tie, drawing it to a positive tightness and making it absolutely secure. Its speed of operation in the hands of the cheapest laborers is two to three times faster than with pliers or other methods. Can be learned in five minutes practice. Very simple, very practical, greatly reduced costs.



Guarantees
full speed in cold
weather.

Eliminates the
inaccurate human
element.

Rods cannot
slip.

Tools are not
lost as with
pliers.

Booth 59
Chicago Cement Show

Descriptive Booklet G,
prices and information

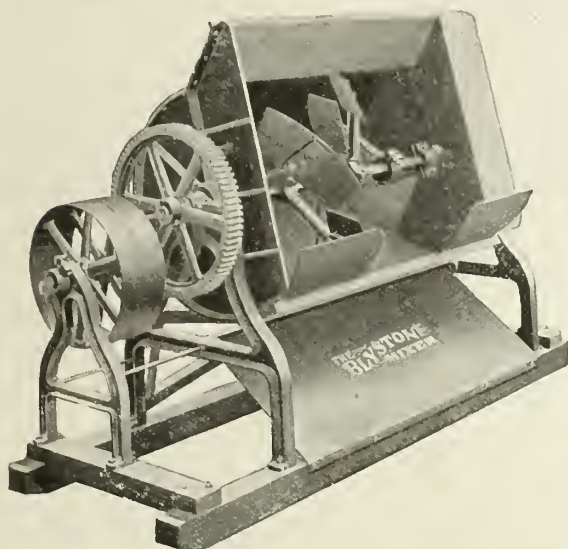


Clifford L. Miller & Co.

110 East 23rd St.,

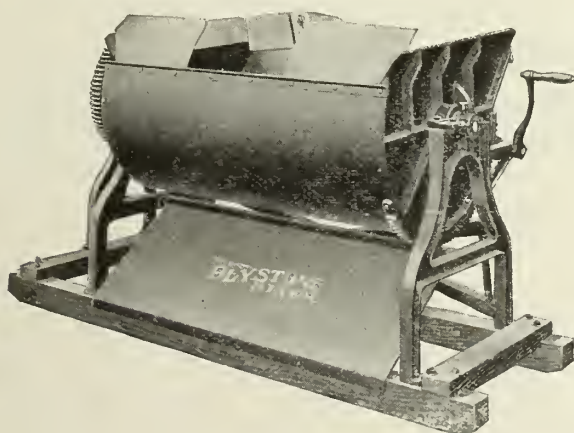
NEW YORK, U. S. A.

—when you buy a Blystone mixer you buy no frills, no fancy-work



Blystone Skid Mixer for Block Plants

No hoist, no charging hopper, no rickety discharge paraphernalia—just a plain, simple mixer that will do the work required. The price is low.



Three Turns of the Crank Dump the Mixer

Not a superfluous casting on this machine. We sell this mixer at a low price because we have eliminated useless and expensive attachments.



Blystone Mixer on Trucks.

Power attached. Simple, compact, solidly built. Try it on your sidewalk work.

The Blystone Batch Mixer was designed to mix a large volume of concrete and mix it well, at the lowest cost. It has none of the cumbersome, unwieldy loading and dumping devices that cost you money, eat up power, take up space and add nothing to the quality or volume of your concrete.

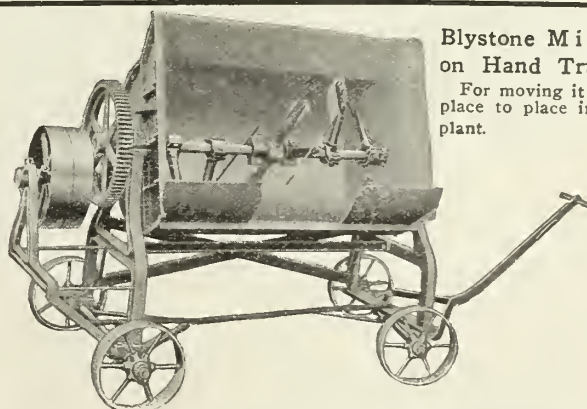
FOR BLOCK, BRICK AND TILE PLANTS our skid mixer is the most economical machine you can buy. Mixes concrete actually cheaper than you can mix it by hand—and much better.

It is low enough to be easily charged—a low platform enables you to dump materials direct from barrows. The plowing blades cut and turn and churn the materials until every piece of stone or gravel is evenly coated with uniform sand-cement mortar.

The mixer is charged while it is working. It is discharged by turning the crank, without stopping the mixing operation—the plows scoop out the entire batch.

FOR SIDEWALKS, PAVING AND GENERAL CONSTRUCTION our mounted mixer, with power attached, has all the advantages that the skid mixer has. It occupies little room—mix can be dumped directly into the forms.

When you buy a mixer, figure on what you are paying for. Don't buy a lot of attachments that add to the cost of the machine without adding one cent to its actual working value.



Blystone Mixer on Hand Trucks

For moving it from place to place in the plant.

WRITE FOR THIS CATALOGUE

It describes the Blystone Batch Mixer in detail. It contains valuable mixing data. Get a copy before you buy any mixer.

Blystone Machinery Co.

50 Venango St.,
CAMBRIDGE SPRINGS, PA.

SEE THE BLYSTONE BATCH MIXER AT THE NEW YORK, OMAHA, CHICAGO AND KANSAS CITY CEMENT SHOWS

In writing Advertisers please mention CONCRETE.

The Westmoreland Chemical & Color Company's OXIDES of IRON

☐ Have greater coloring capacity than any other red pigments—

☐ Are being used extensively for cement, concrete and brick work—

☐ If you use colors **DON'T FAIL** to **WRITE US** for samples and prices.

925 Chestnut Street, Philadelphia,
or 92 William St., New York.



Illustration No. A320.

Success Sewer Pipe Molds



are the simplest, most easily handled molds on the market for drain tile and sewer pipe. Our molds are made for tongue-and-groove pipe bell end and plain. One of our special types permits the use of the

Wet Process.

Concrete is poured wet into the molds, making tile of great density and strength.

Write for free booklet on concrete pipe manufacture. It's free.

Address

GROH BROS.

228 S. Morton St.
Kendallville, Ind.

Handle Concrete at a Profit

If you want to increase the cubic yards of material handled, if you want to show a profit instead of a loss, discard obsolete methods such as hand-filled dump buckets and hand shovellers—use

Hayward Buckets for Handling Concrete Materials

The illustration above shows two 1 cu. yd. Hayward Clam Shell Buckets, transferring two and three inch crushed stone from scow to hopper. No hand labor is required. Hayward Buckets are automatic in action and will handle concrete materials of almost every nature at the greatest economy over hand labor conditions.

Write for Catalog and Pamphlets.

The Hayward Company

50 Church St.

New York



Using Zeiser Tie and Dividing Plates with Wood Side Rails.
Grant City, S. I., July 31, 1911.

Zeiser Bros., Berwick, Pa.

Gentlemen:—The forms which we purchased from you earlier in the season are giving excellent satisfaction and we consider them an absolute necessity for concrete sidewalk work. A number of makes and styles of forms are being used by various contractors in our district, but all have some fault or disadvantage except yours, which WE have found entirely satisfactory.

Very truly yours,

DIAMOND CONCRETE WORKS,
Per Frank K. Galloway.

Messrs. Zeiser Bros., Berwick, Pa.

Gentlemen:—I received the new style dividing plates and wish to thank you for your prompt shipment. As you are aware, I am now using your steel side rails and dividing plates and would not care to lay walks without this outfit. These rails and ties, alone, have brought me some twenty odd jobs this summer, and the people in this section do not seem to care to have the old style rails used at any cost.

Aug. 31, 1911.
Centre Hall, Pa.

W. GROSS MINGLE.



Section of Zeiser All Steel Forms.

Sidewalk Construction

MADE EASIER, BETTER and
MORE PROFITABLE

Mr. Sidewalk Contractor—

Do you want to be the leading sidewalk man of your town or city?

If you do, you must be able to do the best work for the least money.

In order to do this you must have modern equipment. You must have Forms which can be quickly set up and easily taken down; Forms that can be used over and over again, and will be as good as new at the end of the season; Forms that will make Safe, Sane and Slightly Expansion Joints at every cross joint;

Forms that will insure Perfectly Straight Work, and reduce labor cost.

ZEISER TIE AND DIVIDING PLATES for use on wood side-rails, or **ZEISER ALL STEEL SIDEWALK FORMS** will fill your requirements. They will lighten your burdens, and put money in your pocket.

There are more **ZEISER FORMS** in use and being sold every day than of all others on the market put together.

There Is a Reason

Write for information and prices. Don't delay. Do it today.

ZEISER BROS.

1318 E. Eighth St.

BERWICK, PA.



Stained with Cabot's White Waterproof Cement Stain.
Harry B. Shoop, Arch't, Harrisburg, Pa.

CABOT'S Waterproof Cement Stains

*Soft, Artistic and Durable Colors
Completely and Permanently Waterproof*

These stains cure both of the great defects of cement as a building material, i. e., its porous character and its cold, cheerless monotony of color. They thoroughly waterproof the surface and color it in soft, rich tones without covering or spoiling the texture. They are not "painty" and cannot crack or chalk or peel. They are cheap, easy to apply and beautiful. Send for catalogue and full information.

SAMUEL CABOT, Inc., *MFG. CHEMISTS*
BOSTON, MASS.
1133 Broadway, New York. 350 Dearborn Ave., Chicago.

Agents all over the Country.

Cabot's Creosote Stains, Waterproof Brick Stains, "Quilt," Conservo Wood Preservative.

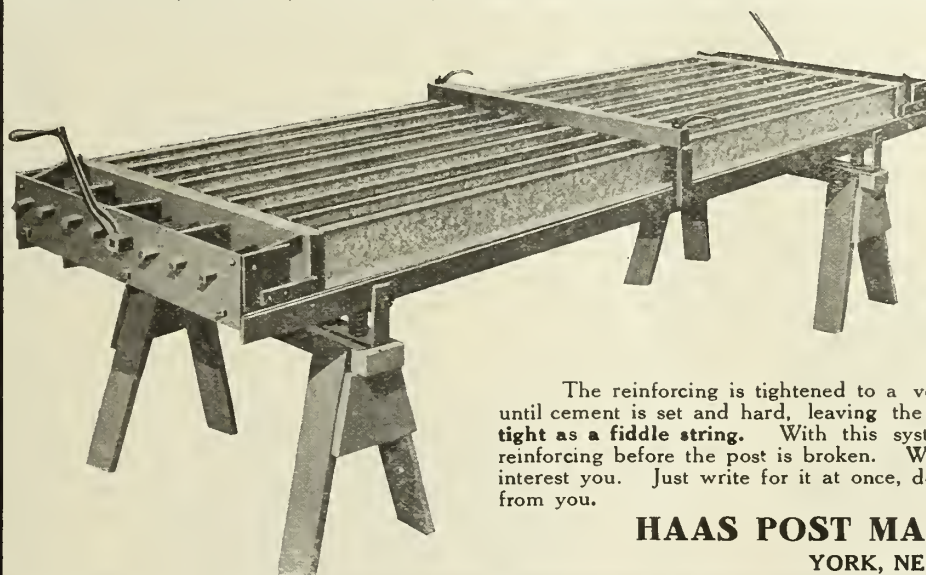
ADVERTISERS' NOTICE

Changes in copy and discontinuance orders for March number of CONCRETE must reach this office not later than February 15.

New advertising can be accepted as late as March 1.

CONCRETE PUBLISHING CO.

Detroit, Mich.



THE "HAAS" Post Machine

THE NEW SYSTEM
Tightens the Reinforcing

The reinforcing is tightened to a very high tension which is held until cement is set and hard, leaving the reinforcing in the finished post tight as a fiddle string. With this system you get the benefit of your reinforcing before the post is broken. We have a proposition that will interest you. Just write for it at once, don't put it off. We want to hear from you.

HAAS POST MACHINE CO.,
YORK, NEBR.

HESS MEDICINE LOCKER

**The Only Modern, Sanitary
STEEL Medicine Cabinet**

or locker, finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimmings. Steel or glass shelves.

Costs Less Than Wood

Never warps, shrinks, nor swells. Dust and vermin proof, easily cleaned.

Should Be in Every Bath Room

The Recessed Steel Medicine Cabinet

For styles—four sizes. To recess in wall or to hang outside. Send for illustrated circular.

HESS, 902L Tacoma Bldg. CHICAGO

Makers of Steel Furnaces.

Free Booklet.

The Outside Steel Cabinet



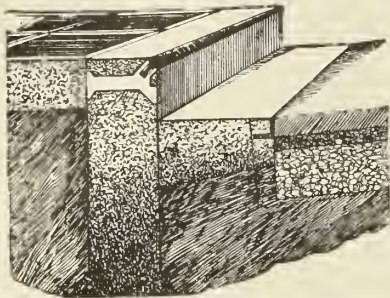
Men pooh, pooh, sometimes, at "Book Learning." A man's own experience certainly is the best teacher. But a man's own experience doesn't contain enough to be all-sufficient. He must know what experience other men have had. The knowledge of other men's experiences is to be found in books. Practically every book of value to the concrete worker is listed in a catalog which will be sent to you by the CONCRETE PUBLISHING COMPANY, 97 Fort Street West, Detroit, Michigan, merely for the asking.

WAINWRIGHT GALVANIZED STEEL CORNER BAR

FOR PROTECTING EDGES OF CONCRETE CURBS, STEPS, COLUMNS, ETC.

"Wainwright
Patents."

March 9, 1897
Nov. 22, 1898
May 5, 1903
March 26, 1907
August 29, 1907
August 2, 1910



This bar has been in public use for more than ten years as the main feature of the

WAINWRIGHT STEEL-BOUND CONCRETE CURB

ABSOLUTELY NON-BREAKABLE
CHEAPER THAN GRANITE



GALVANIZED STEEL CORNER BAR prevents Chipping or Breaking on Edges.
MECHANICALLY PERFECT AND UNEQUALLED FOR CURVED CORNERS.

THE BEST IN THE WORLD, Over Three Million Feet in Use in More Than Three Hundred Cities

THIS CURB WILL STAND HARDER USE AND LAST TEN TIMES AS LONG AS PLAIN CONCRETE CURBING

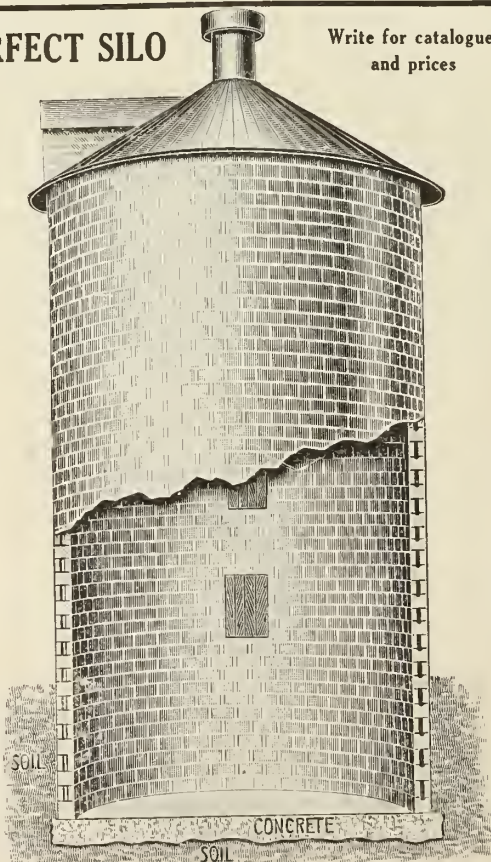
CONTRACTORS can make money by laying this curb. CITY ENGINEERS can save money by specifying it. ARCHITECTS are invited to read pages 242 and 243 "Sweet's Index."

METAL PARTS FOR SALE. SEND FOR COPYRIGHTED BOOKLET NO. 2.

STEEL PROTECTED CONCRETE CO., Real Estate Trust Bldg. **PHILADELPHIA, PA.**

PERFECT SILO

Write for catalogue
and prices

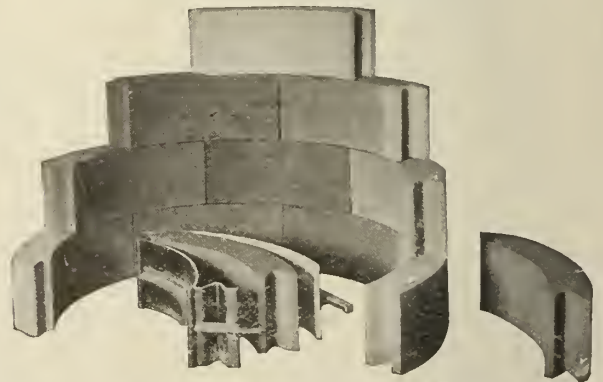


C. S. WERT, Inventor and Manufacturer Home Office: 602 N Main St. **Kendallville, Indiana**

THE PERFECT CISTERN AND SILO MOLDS

ARE USED IN ALL PARTS OF THE WORLD

OUR MOLDS are the BEST and CHEAPEST
ever offered to the Public



The Perfect Well, Cistern and Silo Mold

THESE Well, Cistern and Silo Molds are among the most useful articles a concrete products manufacturer can have about his plant. These Molds as well as the PERFECT Brick Machine will be in operation daily at the N. Y. Cement Show. as well as at Chicago, Kansas City and Omaha, Nebr. Come and see the Brick Machine that leads all others. Convince yourself and be your own judge in selecting your Concrete Brick Machine.

Write for the 1912 Catalogue, address

C. S. WERT, Kendallville, Ind.

SUCCESS

THE
SCHENK
PROCESS

EXPERIENCE

THE SCHENK
TILE MACHINE
(JUNIOR A)\$ 500⁰⁰THE SCHENK
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TILE MACHINE
(Nº1. MODEL A)\$ 750⁰⁰THE SCHENK
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TILE MACHINE
NUMBER TWO\$ 1400⁰⁰GOOD
MATERIALGOOD
WORKMANSHIP

GOOD PRINCIPLE

THE LIGHT WHICH WILL GUIDE
YOU SAFELY PAST THE
ROCKS OF FAILURE

When you embark in the manufacture of cement drain tile and float down the harbor of this great commercial enterprise—you should be sure that your craft is staunch and stable and that your productive power has the efficiency to carry you through the narrow straits of business.

In most lines of industry a certain amount of "sailor luck" must be imbibed in the men at the helm in order that they may succeed—but in the manufacture of cement drain tile you can—if you will—employ a capable pilot who will guide you safely past the rocks of failure and on beyond to the world of success and profit.

This pilot—

The Schenk Process

Is founded on the solid rock of good principle, permanently concreted with good workmanship and material; placed upon a base of experience and crowned with success—it stands, a monument, a guiding light to the cement drain tile industry.

You can receive the services of

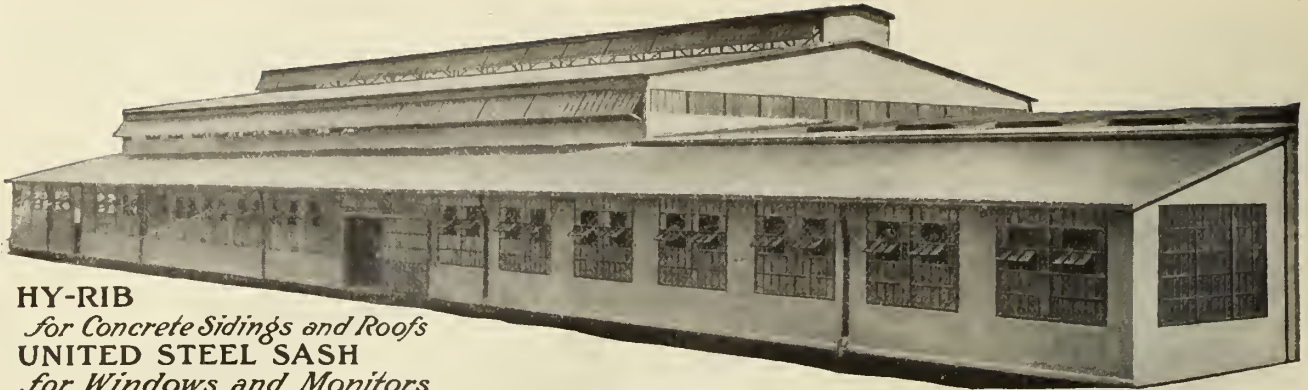
this experienced pilot at your own price—whether it may be \$300, \$500, \$750, \$1,000 or \$1,300—for in each Schenk Machine are embodied the Schenk Principles and the Schenk Process, which mean dollars to the man intending to establish a cement drain tile plant.

Complete literature on the manufacture of cement drain tile will be sent to any address free.

The Cement Tile Machinery Co.

"Creators of The Cement Drain Tile Industry"

WATERLOO, IOWA.

**HY-RIB***for Concrete Sidings and Roofs***UNITED STEEL SASH***for Windows and Monitors***HY-RIB CUTS DOWN BUILDING COSTS****In Sidings:** Gives a monolithic concrete wall at half the cost of brick.**In Roofs:** Does away with centering. Gives a concrete slab of minimum weight.**In Partitions:** Does away with steel studding; saves space and money.**In Ceilings:** No channels, tees or flats—less labor, time and expense.

HY-RIB is a steel sheathing with deep stiffening ribs for concrete and plaster work—a combined unit of reinforcement, centering, studs, and lath.

HY-RIB concrete construction is fireproof and permanent—more economical than wood, corrugated iron or brick. HY-RIB is simple to use, requiring no special equipment.

Write for HY-RIB Handbook—112 pages of valuable building information sent Free, if you write us about your building.

**TRUSSED CONCRETE STEEL COMPANY**

650 Trussed Concrete Building
DETROIT, MICH.



Make Lower Bids—And Higher Profits

BY USING OUR LONG HANDLED FINISHING TOOLS

One finisher can do several times as much work in a day as he can with hand tools; smoother work, too. Tools are equipped with long handles to enable operator remain standing at his work. Saves backaches and sore knees. Finisher trowels backward and forward across the walk. All the work may be performed from one side of the walk. Our patent device automatically tilts the edge of the trowel blade to prevent digging into the mortar.

SENT ON FREE TRIAL—No Cash in Advance

Any tool or complete set sent to any responsible contractor on 10 days' trial. No cash in advance. Try them on your own work before paying for them. We make trowels, jointers, edgers, floats, etc.

Free catalogue mailed on request—send in your postal today. Address

Twentieth Century Manufacturing Co.,

1650 LOWE ST., - - - CHICAGO HEIGHTS, ILL.

200 NEW FIRST CLASS ROOMS
With Free Shower Bath

HOTEL Bismarck

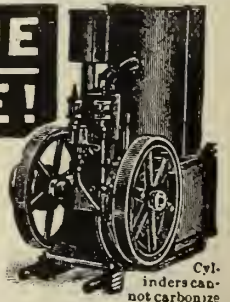
CHICAGO

173 W. RANDOLPH ST. NEAR CITY HALL

RATES \$1.00 UP. PRIVATE BATH \$1.50 UP

Use KEROSENE Engine FREE!

Set this engine up in your plant and use it 15 days on your mixer, tile machine, block press, pump or other equipment. Try it out. If it makes good, buy it. If you don't like it, send it back. Don't burn gasoline when you can get an engine that uses cheaper fuel—lamp kerosene, alcohol, benzine or paraffin—like the

**AMAZING "DETROIT"**

The "DETROIT" is the only engine that handles coal oil successfully. Starts without cranking. Basic patent—only three moving parts—no cams—no sprockets—no gears—no valves—the utmost in simplicity, power and strength. Mounted on skids. All sizes 2 to 20 h. p., in stock ready to ship. Complete engine tested just before crating. Comes all ready to run. Prices (stripped) \$29.50 up. Guaranteed for five years. Warranted to develop more than rated horsepower. Ask about 15-trial offer.

Detroit Engine Works, 535 Bellevue Avenue, Detroit, Mich.

Mr. Concrete Man:

Make More

money---do less work---make less investment---no machines needed---little shop room---here's how---

I have been in the concrete business many years. I know that some of the big work isn't profitable and that the small side lines are. I can supply you with formulas and complete instructions for making

Artificial Marble

that defies detection. It's made of Portland cement, sand and coloring matter. You make the molds yourself. Duplicate any marble at less than one-fifth the cost of the natural product.

You can compete with natural stone—sell your product at a lower price, make a good profit and give your customer a better material. Every concrete plant should be turning out this artificial building stone.

Lawn Rollers

One of the side lines I suggest is the manufacture of lawn rollers. For details, send me Coupon No. 1.

For information about my Concrete Marble Process, Color Work Specifications, Plaster and Glue Mold Instructions, etc., send Coupon No. 2. I'll send a circular—it costs nothing to investigate.

Art Stone Company

Amos Stouffer
Prop.

Box 304,

Waynesboro, Pa.

See our exhibit at Chicago
Cement Show,
Booth 61.

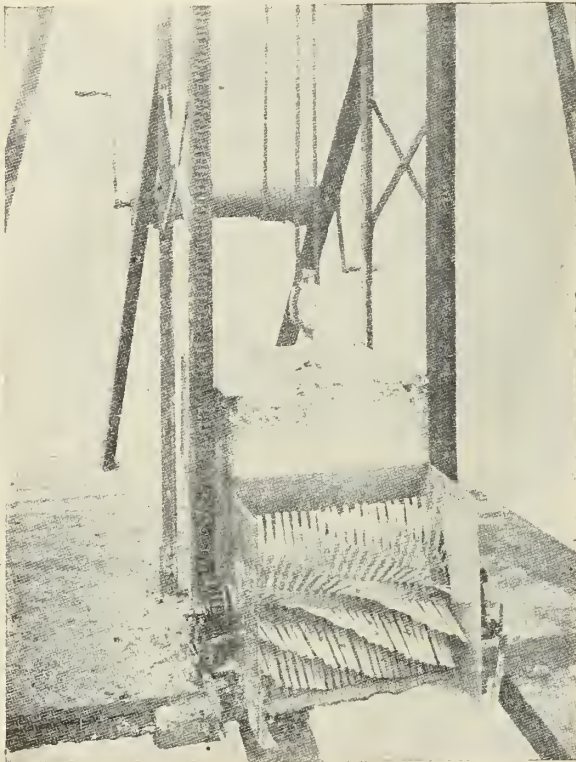
Amos Stouffer, Box 304, Waynesboro, Pa.
Lawn Roller Mold Coupon.
Please send me circular describing your Concrete
Lawn Roller License.
Name.....
Address.....

1

Information Coupon.
AMOS STOUTER,
Box 304, Waynesboro, Pa.
Please send me circular describing your
Confidential Trade Notes about Artificial
Marble, etc.
Name.....
Address.....

2

AUTOMATIC Stucco Machine



A New Device For the Rapid and Economic Application of Cement Plaster and Rough Cast Stucco to Exterior Walls. Will do in One Day what Two Men Take a Week to do by Hand

This machine is mounted on a platform and placed on rollers. Easily moved. The uprights (or frame) resemble bare construction of an elevator shaft and can be extended as high as desirable. Made in sections and easily transported.

The steel springs (shown in cut) do the work. These hardened steel springs engage the bottom of the hopper, which is mounted on the uprights. Operated by hand with windlass handles and block and tackle; this moves hopper up or down, and also revolves steel springs, throwing the Stucco with great force on the surface.

The Automatic Stucco Machine is easily and speedily operated at low cost. Work done with it is superior to that done by hand. Contractors using this machine can destroy all competition. For renovating old houses, stucco work done on this machine is as cheap as painting, adding greatly to value of building.

Further information, literature and prices furnished on request.

Territorial rights for sale; apply early.

See Exhibit at Chicago Show.

AUTOMATIC STUCCO MACHINE CO.

Dept. C, Port Chester, N.Y. New York Office, 264 A 4th Ave.

RAINBOW Rubber Belting

We guarantee our "Rainbow" belt to meet the requirements of concrete and cement plants. ☐ It is made of specially constructed duck from long staple cotton, and thoroughly stretched. It will stand a friction pull of 22 lbs. ☐ Manufacturers of high grade mechanical rubber goods, including the "perfected" brand of Hose of all kinds, Pump Valves, etc. ☐ Sole manufacturers of the celebrated Rainbow Sheet Packing.

Peerless Rubber Mfg. Co.

16 WARREN AVENUE, NEW YORK

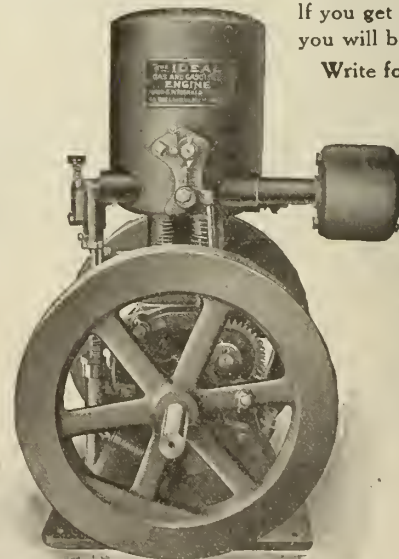
For years the Ideal engine has been furnishing power to operate cement mixers, tampers and tile machinery, and we can refer you to thousands of satisfied customers.

The Ideal engine is light weight for power delivered, workmanship and material are first class and the prices reasonable.

Built in sizes from 1½ to 9 H. P.

If you get an Ideal engine you will be satisfied.

Write for catalog.



**Ideal
Gas
Engine
Company**
Lansing, Mich.

ANNOUNCEMENT**New Southern Hotel**

13th Street and Michigan Boulevard
CHICAGO, ILLINOIS

Under New Management. Wm. C. Keeley, Prop.
COMPLETE IN APPOINTMENT
—ARTISTIC—ABSOLUTELY FIREPROOF
300 ROOMS—200 WITH BATH—
CIRCULATING ICE WATER
EUROPEAN PLAN
TWO BLOCKS FROM COLISEUM

Rooms with hot and cold water for one person,
\$1.00 and \$1.50 per day; for two persons, \$2.00 and
\$2.50 per day. Rooms with private bath for one per-
son, \$1.50 to \$3.00 per day; for two persons, \$2.00 to
\$4.00 per day.

WM. C. KEELEY
Proprietor

C. H. SHAW
Assistant Mgr.



Three identifying Marks
One Green Edge and the Trade Mark
Shown Above with Brand

"The Gandy Belt"

Every genuine GANDY BELT has these three identifying marks to protect you against the many inferior imitations.

The Gandy Belt

is made by the oldest and largest manufacturers of stitched cotton duck belting in the world. The Standard Cotton Duck Belt for 36 years. Costs only one-third as much as leather and two-thirds as much as rubber. Does the work equally as well.

Remember

There is only one GANDY BELT, made by the Gandy Belting Company of Baltimore, Md.
Send for sample and prices today.

The GANDY BELTING COMPANY
753 W. Pratt St. Baltimore Md.
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Auditorium Hotel

W. S. SHAFER, Manager

Most massive fireproof structure ever erected for hotel purposes, with an equipment second to none. Improvements made under the present management have cost over \$300,000. High class restaurant and the best facilities for serving large and small banquets.

Rates per day: \$2 and up single; \$3 and up double. With private bath \$3 and up single; \$5 and up double.

Michigan Boulevard and Congress St.; Chicago, Ill.

Windsor-Clifton Hotel

Eight minutes ride to Coliseum on surface cars passing our hotel. In center of theater and shopping district. Long distance phone in every room.

250 rooms, European plan, rates \$1.00 and upwards.

N. W. Cor. Monroe St. and Wabash Ave., CHICAGO

STRONG COLORS FOR CEMENT

Red, Black, Buff, Green, Blue, etc.

C. J. OSBORN COMPANY 268 Water St.
New York, U.S.A.

"HOW TO USE CONCRETE"

249 Pages, Cloth Bond. \$1.00 a Copy

CONCRETE PUBLISHING CO., - Detroit, Mich.

My story is long—it occupies four pages in this issue of "Concrete."
See pages 151, 152, 153 and 154.

HERMAN BESSER.

Liner Advertisements

Rates for these columns: Three cents per word per insertion, payable in advance. Copy can be accepted as late as the first of any month for that issue.

MACHINERY WANTED

WANTED—New or second hand machines to make hollow or solid slabs measuring from 2 to 4 inches thick by 13x18, or near that size.

WANTED—Conveyors to carry sand and gravel; new or good second hand.

WANTED—Good second-hand power or hand mixer. Nathan Levy, 75 W. 25th St., Bayonne, N. J.

WANTED—Good second-hand Batch Mixer. State price and details. C. F. Kleiderer & Son, Henderson, Ky.

WANTED—Complete second-hand cement sidewalk outfit. Also second hand continuous mixer. Address Box 104, care of Concrete Publishing Co., Detroit, Mich.

WANTED—Second-hand Perfect or Peerless brick machine. C. C. Harshbarger, Ladoga, Ind.

HELP WANTED

SUPERINTENDENT WANTED—A cement products factory employing 70 men and operating 20 hours per day, have a position open for a wide-awake and energetic superintendent who will take a financial interest in the business. None but high class men need apply. Address "G," care of Concrete Publishing Co., Detroit, Mich.

WANTED—Experienced Foreman in Concrete Block Plant. Give full particulars with salary expected or no attention. Address Box 102, care of Concrete Publishing Co., Detroit, Mich.

WANTED—Superintendent for Concrete factory in Alberta, Canada, to have experience in manufacture of block and concrete stone, moulding, sand-casting, etc.; able to take quantities from plans and details and take full charge of factory. Apply with copy of references and stating salary expected, to Box 105, Concrete Publishing Co., Detroit, Mich.

BUSINESS OPPORTUNITIES

WANT TO SELL part interest in a Concrete Tile and Block Plant. None but a first class concrete man need apply. Plenty of good work when spring opens. J. J. Rittman, Lovington, Ill.

WANTED PARTNER—Will sell half interest in a well established Cement Concrete Business. For particulars call on or address, C. W. Pressell, Pocomoke City, Md.

FOR SALE OR TRADE—Complete Concrete Tile and Block Plant, boiler, engine, piping, shafting, Schenck Tile Machine, Kramer Tamper, 4 block machines and pallets, small tools and accessories, 2 mixers; building 60x100. Good yard on sidetrack with sand close. Trade established and paying, but owners interested in other lines and wish to sell to practical man. \$14,000 plant will be sold cheap. Box 263, Ottumwa, Iowa.

FOR SALE—The rights to manufacture the best Combined Block and Brick Machine ever devised. S. Strong, Terre Haute, Ind.

FOR SALE—A good Cement and Concrete Works. Write for particulars. Address P. O. Box 4, Beloit, Kansas.

Manufacturers and Contractors

TAKE NOTICE:

We can supply you with information that will obtain new business for you throughout the entire country. We can put you in touch with parties who are planning the erection of new brick, cement, concrete, tile plants, etc. Write us today and we will give you complete information.

UNITED STATES PRESS INFORMATION BUREAU
1309-153 La Salle St., CHICAGO, ILL.

DEXTER

Sole Agents **SAMUEL H. FRENCH & CO.** Philadelphia

Portland Cement

THE NEW STANDARD



FOR SALE—Concrete Machinery

FOR SALE—Regardless of cost: 1 McCracken double tile machine used only a few days; 1 complete Pettyjohn block outfit with 150 pallets; 50 post molds, made only 3 posts each; 1 Little Grand continuous mixer. Address Box 92, care of Concrete Publishing Co., Detroit, Mich.

FOR SALE—Jaeger Positive Mixer, Somers Concrete Block Press, Balluster molds, Pier molds and Cap mold. Automatic Concrete Block Tamper, 2 H. P. Gasoline Engine, 6-8 H. P. Gasoline Engine. Farmers Cement Tile Machine. All or separate, cheap for cash. Box 211, Bala, Penna.

FOR SALE—At Sacrifice:
1 Tilting Batch Mixer—Semi-open drum, fully equipped with power loader, steam engine and boiler, and mounted on trucks. Capacity, 9 cu. ft. Never used.

1 Continuous Proportioning Concrete Mixer of standard make. Has low feed. Is fully equipped; mounted on skids; capacity, 60 cu. yds. per day. Never used.

1 Blystone Batch Mixer—Just the thing for concrete products plant.

3 Block Machines—Face down 8x12x24", all complete. Never used. Are a standard make.

2 Brick Machines of standard make, fully equipped with gang tampers, hoppers, etc. Make 10 brick at one time.

1 Peerless Brick Machine with gang tamper complete.

Three 2½ horsepower Gasoline Engines, vertical type. Used.

Will sell all at once, regardless of price. For full particulars address Box 101, care of Concrete Publishing Co., Detroit, Mich.

FOR SALE—One Helm brick and block lever power press, capacity 5,000 brick per day. Having finished my building here, and there being no sale for block, will sell at moderate price. Machine in good order. Makes solid block 2x8x12" and 24". C. E. Jones, Carysbrook, Va.

FOR SALE—Two J. B. Foote Union Leader 8x8x16" cement block machines, 6 different face plate designs, making halves, quarters and all bay window angles, with 400 iron pallets. Price \$125.00. Address John W. Nelson, Raspeburg, Md.

SACRIFICE SALE—New Hayden Automatic Block Machine, 8x8x16", Rock and Plain Faces, 300 iron pallets. Will be shipped from Northern Indiana. Price 50% of original cost. Jesse P. Montz, 722 N. 10th St., Waco, Texas.

FOR SALE CHEAP—Power driven concrete block machine, mixer and press combined; capacity, 1,000 blocks per day. Address E. Mistleski, Cor. Union Ave. and Simpson St., Alliance, O.

MACHINERY FOR SALE—Kramer Tamper, 24-inch, perfect condition, \$100.00; two U. S. Standard Block Machines; two Snell Mixers; Sill Machine; Pallets, etc. Abbey-Brooks Co., Newark, N. J.

FOR SALE—One Ferguson Tile Machine, one Hartwick Mixer, one 7 H. P. upright boiler and engine. Cement Products Co., Covington, Ind.

FOR SALE—Anchor Block Machine, also hand mixer. Frank E. Jolliffe, Ottosen, Iowa, R. R. No. 2.

FOR SALE—U. S. Cement Block Machine. Address Den Adel & Van der Heiden, Pella, Iowa.

FOR SALE—Write Wettlaufer Bros., Buffalo, N. Y., for their Catalog with new plan of selling at bottom prices on Mixers and Brick Machines.

HAVE YOU RECEIVED our famous Catalog "D", the great money saver on Contractors', Cement and Concrete Machinery Mixers, cars, rails, etc. Mailed everywhere. M. Mithskun Co., Detroit, Mich.

SPRUNK

Engraving Co.



☐ You sidewalk contractors should let the men who work for you into the secrets of the niceties in sidewalk building. If your workmen are intelligent in their work, certainly the result is going to redound to your credit and make your business larger and more profitable.

☐ Why not put the knowledge of the best methods into the hands of the men who do the work. The seventh edition of a little pocket-size book, "CONCRETE SIDEWALKS," containing chapters on curbs, gutters, floors and pavements, costs but 35 cents. Buy a book for each of your men—and one for yourself. It will be money in your pocket. Address CONCRETE PUBLISHING COMPANY, 97 Fort St. W., Detroit, Mich.

FOR SALE—Miscellaneous

MAKE a Good Block Machine for about fifty cents. Illustrated Directions One Dollar. Have for sale the best brick and block machines cheap. William Barten, Gordon, Nebraska.

THERE is big profit in molding concrete lawn vases. One man using A Rapid Concrete Lawn Vase Mold completes a vase every 15 minutes, at a cost of 22 cents each. Vases sell for \$3.50 to \$15.00 each. Write for Free information today. A. A. Houghton (Foundry Dept.), Northville, Michigan.

Mr. Reader:--It will pay you to watch this page from month to month

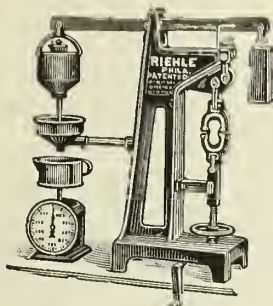
ADVERTISERS

To manufacturers of small specialties not profitably advertised in big space and manufacturers of heavy equipment who want to "feel out" this field we recommend the use of advertising space on this page. Advertising space here is given distinctive position, and will bring results. This rate is low because no large space is sold; you can keep your proposition before our readers the year 'round at little expense. No advertisement accepted to occupy more than 3 inches, single column, on this page. Ask for rates.

Mixers and Brick Machines

Write us for our catalog and new plan of selling mixers and brick machines at rock bottom prices.

Wettlaufer Bros.
Buffalo, N. Y.



**RIEHLE
AUTOMATIC
CEMENT
TESTING
MACHINE**

Pat. Nov. 8, 1904

Solid Back Grip

Pat. Sept. 11, 1906

Pat. June 10, 1904

Testing Outfit

1424 North 9th St., Philadelphia, Pa.

CHARLES E. SIMS Consulting Engineer
Worthington, Minnesota.

Cement drain tile factories designed. Detailed plans, specifications and cost for building and equipment. Proposed sites investigated.

BATCH MIXERS

Best machines for block plant work. High capacity, low price.
CENTURY CEMENT MACH. CO.
285-295 St. Paul St.
Rochester, - - N. Y.

REICHERT METAL FORMS

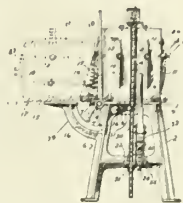
Save 3 Cents Per Square Foot
on Concrete Walls.

Reichert Manufacturing Co.
MILWAUKEE, WIS.

Block Machine Opportunity

Will sell patterns and patents or will lease manufacturing rights of Concrete Block Machine and Hand Lever Press. Makes block up to 16 in., any style, rapid, face-down, wet mixture. None except buyers need apply. No agents wanted.

John Wengs,
506 First St.,
Detroit, Mich.



For Building Concrete Steps

My adjustable form holders enables any man to set up forms for steps, one piece at a time. Every part of form true and square. Take form down one piece at a time. Saves time, labor and money. Patent applied for. Send for circular and prices.

H. L. PARK
Reading, Mass.

Sanitoid Flooring

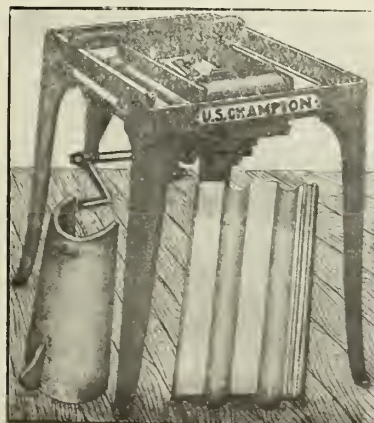
A Composition Mineral Substance laid in monolithic form and producing a fireproof, waterproof, permanent, and sanitary flooring base, or wainscot. Methods of installing SANITOID are simple and easily learned. Can be sold at good profits for a hundred different uses. Write for material costs and territory, rights today.

The Sanitoid Products Co.
701 Brunson Bldg. COLUMBUS, O.

Barten Process and Machine for making Concrete Building Blocks of a Slushy, Muddy Mix, also of a Moist Mix

The strongest, waterproof perfect blocks. No curing expense. No pallets. Also makes drain tile, hollow blocks, sidewalk paving blocks and hollow wall. One man operates as fast as you shovel concrete into machine. Weighs about 30 lbs. Make blocks anywhere, even on a roof or in a cellar. Carries like a suit case. Handy as a trowel. Makes blocks any length, 2 to 24 inches. Any thickness, 1 to 4 inches. Adjustable to do any of the above in one minute. Set of beautiful oak leaf and acorn face and end plates also set of round edge panel face plates with each machine. Face down method. Malleable iron machine, directions and license now \$35. Price will advance April 1st.

W. H. BARTEN, Gordon, Nebraska



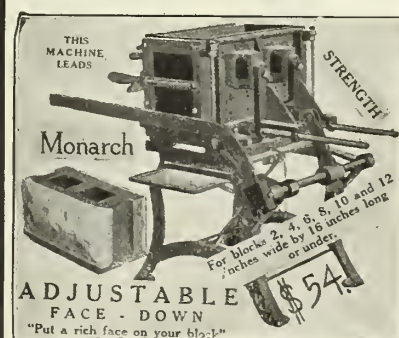
This Cement Roofing Tile Machine (Pat'd 3-12-07)
Is the only practical machine of its kind on the market. For durability and attractiveness the U. S. Champion tile roof supercedes all others. It has no competition. Little investment. Big profit. Write for our new catalog.
L. Hansen & Co. 2036 Penn St., Kansas City, Mo.

Crushed Granite

Screened to size, for concrete or artificial stone. The strongest and most durable aggregate. Two colors, gray or white. Woodbury Gray Granite is mouse-gray in shade. Hardwick White Granite is the whitest granite known. In carlots, at a low price.

Let us quote you also on granite sills or trim for use with concrete work. Quick delivery.

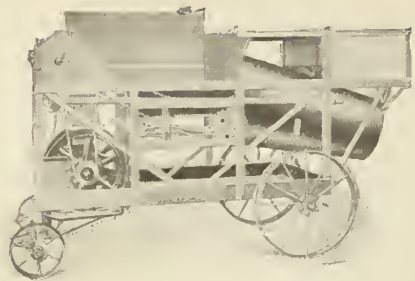
WOODBURY GRANITE CO.,
Hardwick, Vermont.



Get catalog No. 8 for discounts. 6 machines in one, over 2000 in use. Lever operating cores. Latest designs. Quickest adjusted. Makes everything. Investigate it.

Remember the SYSTEMATIC MIXER still leads, 6 styles. Ask about it, see cut on page 128

CEMENT MACHINERY CO.
JACKSON, MICH.



What Would It Be Worth To You?

To know that you can compete with any one and be certain of your profits?

To know that every job will be not only acceptable, but a help in securing other business?

These are the questions you should ask yourself—and they are properly answered by

Little Giant Concrete Mixer

a machine that knows no engine troubles, does its work accurately, swiftly and eliminates almost entirely that bugbear "Up-keep cost."

You have a right to know about the different types of machines we make (both hand and power) and should accept at once our

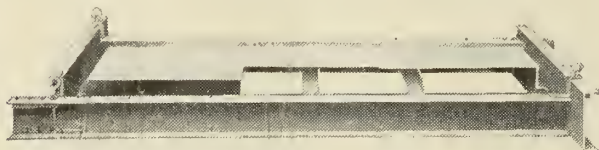
FREE TRIAL OFFER, which will prove conclusively just what a Little Giant can do for you.
Write us at once for detailed information and place your business on a better basis.

We will have a complete exhibit of Little Giant Concrete Mixers at the **Chicago Cement Show, February 21-28,** occupying space number 182. Be sure to come and see for yourself why Little Giants lead them all.

Ballou Manufacturing Co., 104 High St.,
Belding, Mich.

There is no Question

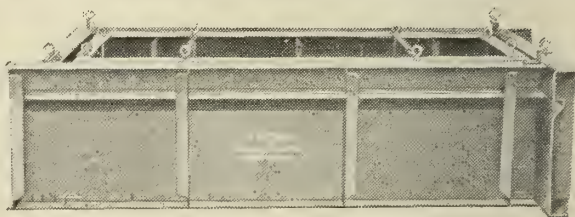
You can make big money manufacturing the Automatic Sealing Vault for your undertakers in your locality. They all like the plan when once it is made known to them. The reason that the Automatic Sealing Vault has been repeatedly termed the "Undertakers' Vault" is because of the fact that every undertaker who learns of it is instantly enthused with its superiority and wants to sell it in preference to all others.



Lid Mold.

To gain control of the manufacture of this vault in your locality would be a big thing to you, although the amount of money required to get it is comparatively small.

Our Adjustable Bessemer Steel Molds that make this vault are adjustable to seven standard and eight special sizes of vaults. These molds are of the highest class of construction and are the most practical and perfect working molds on the market to-day.

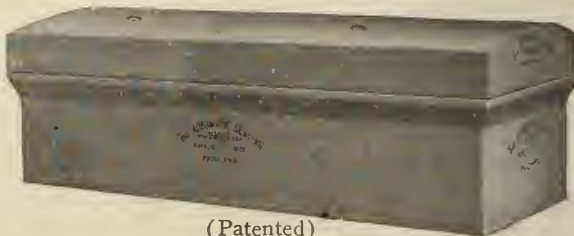


Adjustable Bessemer Steel Molds.

Especially adapted to wet process.
Will be at Chicago Show; call at Booth 5 and see our display.

Write today and get our beautifully illustrated booklets.

More beautiful than stone or steel.



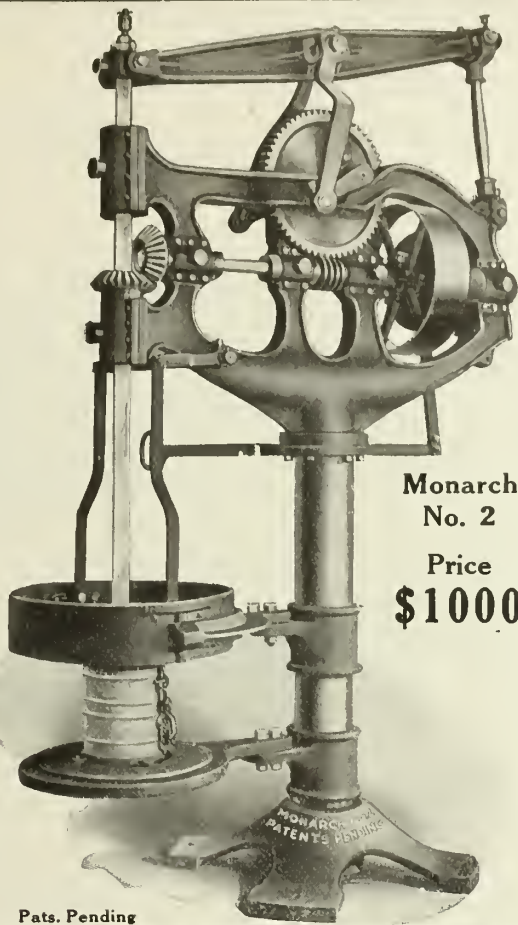
(Patented)

As enduring as the ages.

The Automatic Sealing Vault Co.

PERU, INDIANA.

NOTE.—Try an order of our A. S. V. Waterproofing Solution especially prepared for all kinds of cement products requiring perfect waterproofing. Put up in five-gallon cans at \$1.00 per gallon.



**Monarch
No. 2**

**Price
\$1000**

Pats. Pending

The Monarch Tile and Block Machine

Well—here's one side of it—there are some things on the other side that you cannot see in this half tone.

Here's what tile makers say who have seen it in operation:

"It is sure some Tile machine." "Just the thing we have been waiting for."

"Got them all skinned a mile."

"Why didn't you come out with a machine like that before?"

"Don't see how it can wear out, or where it could be improved."

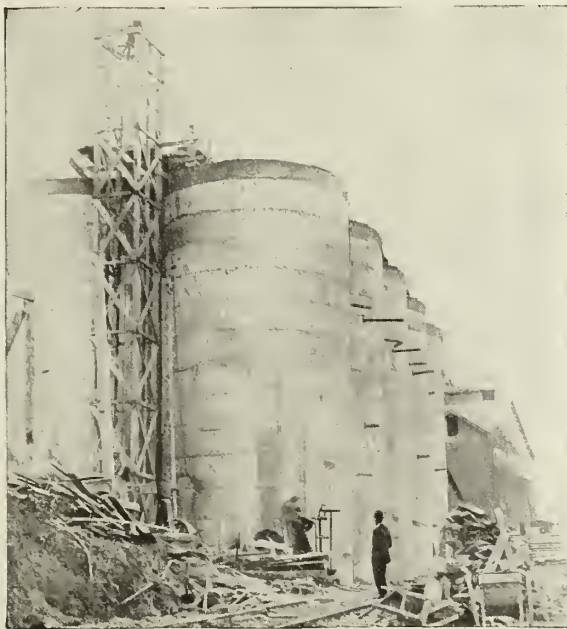
There are more points of merit, which you will welcome. Our catalogue will give you detail information. Write for it.

Our booth at the Chicago Show is No. 81.

Monarch Manufacturing Company

777 Cedar St.

Onawa, Iowa, U. S. A.



These Immense Bins Hold 6,000 Tons and
are Proof that you can have immediate shipments of

GRANITE CRYSTALS

and that their use is past the experimental stage

If you think of building anything of concrete, specify GRANITE CRYSTALS to do away with the dullness of the ordinary cement mixture. The extra expense is insignificant in comparison with results. It converts ordinary cement into SPARKLING GRANITE at an expense of about one cent per square foot.

Our entire equipment, which enables us to turn out one hundred tons per day, is at your service. Formulas and all other information furnished cheerfully.

OUR SPECIAL OFFER: We will furnish three one-hundred-pound bags, assorted sizes, for \$1.00, to prove to you the merits of GRANITE CRYSTALS.

Crown Point Spar Co., 21 W. 4th St., New York

**CROWN
POINT
SPAR CO.
21 West 4th St.
New York City**

Please send the undersigned a sample of granite crystals, containing 300 lbs., consisting of three 100-lb. bags, assorted sizes, for which we enclose \$1.00.
Yours truly,

THE ROSBRUGH Cement Tile Machine

"Works Like a Clock"

Eliminate the Element of Uncertainty from Tile Manufacturing. One tile every ten seconds; six every minute; three hundred and sixty every hour; three thousand six hundred every ten hours—that's the regular steadiness of the **Rosbrugh** Cement Tile Machine. You can depend upon a regular output each day.

The **Rosbrugh** is free from vibrations. There is no shaking about it to tear down the finished product, but it is built strong and rigid to insure a perfectly made tile.

The **ROSBRUGH** is compact, durable, economical, easily operated. The construction is as simple as is consistent with the demands of such a machine. There are no complicated parts to cause delay and expense. Every part is built to withstand wear.

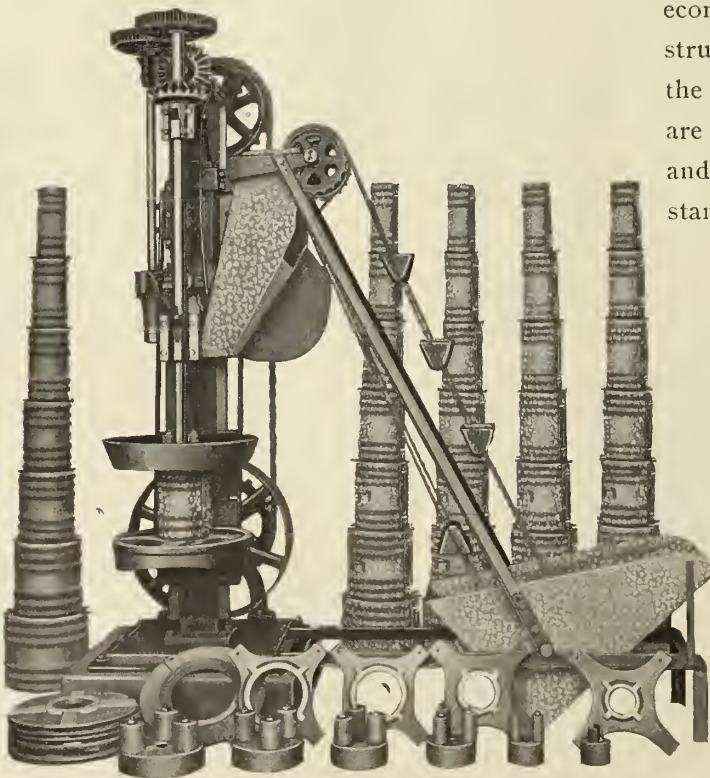
The **ROSENBRUGH** No. 1 is equipped to make tile 4 to 12 inches in diameter, 12¼ inches long.

The **ROSBRUGH** No. 2 is equipped to make tile from 4 to 18 inches in diameter, 12¼ and 18 inches long.

Descriptive folder sent on request.

The **Rosbrugh** No. 1 will be at the **Chicago Cement Show**, Booth No. 187, Feb. 21-28, 1912.

Nappanee Iron Works
Nappanee, Indiana



20th Century Concrete Mixer



*Runs on its
own power
like an auto*

The 20th Century has 4 points of advantage:

- 1—Low Hoppers, 27" high.
- 2—Absolute proportions.
- 3—Traction.
- 4—Semi-steel castings.

The ideal machine for sidewalk, curb and gutter and street paving.

Write for catalogue.

20th Century Mixer Co. Connersville, Ind.

Meet us at the Chicago Cement Show, Feb. 21 to 28.
Kansas City, Mar. 14 to 21.

A System of Concrete Block Construction that Absolutely Insures Dry Walls

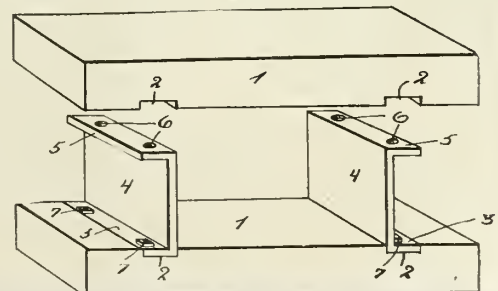
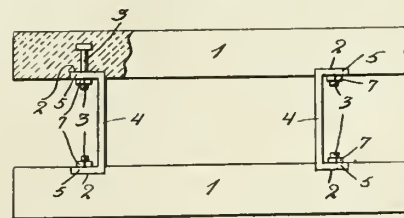
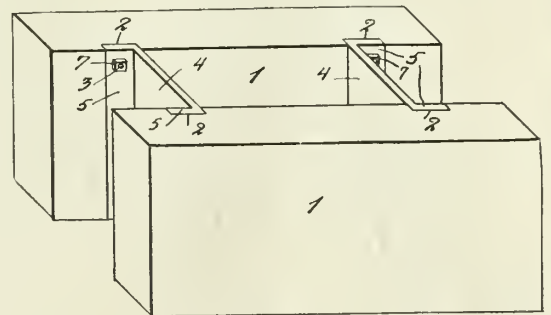
We have for sale a patent covering a System of Concrete Block Construction which overcomes the damp feature of concrete walls. It involves the manufacture of a collapsible two-piece concrete block, the sections of which are tied together by metal separators, allowing no moisture to penetrate the walls.

This block can be handled and shipped knock down and put together at any time or place, and when laid retains hollow space through the building when used. Complete information regarding this patent will be furnished reputable parties who may be interested in its exploitation. We have no machine to sell. Our patent is on the block.

John M. Crocker

Frank T. Tappan

103 East Pearl St., Coldwater, Mich.



Lansing Advance Mortar Mixer No. 1.

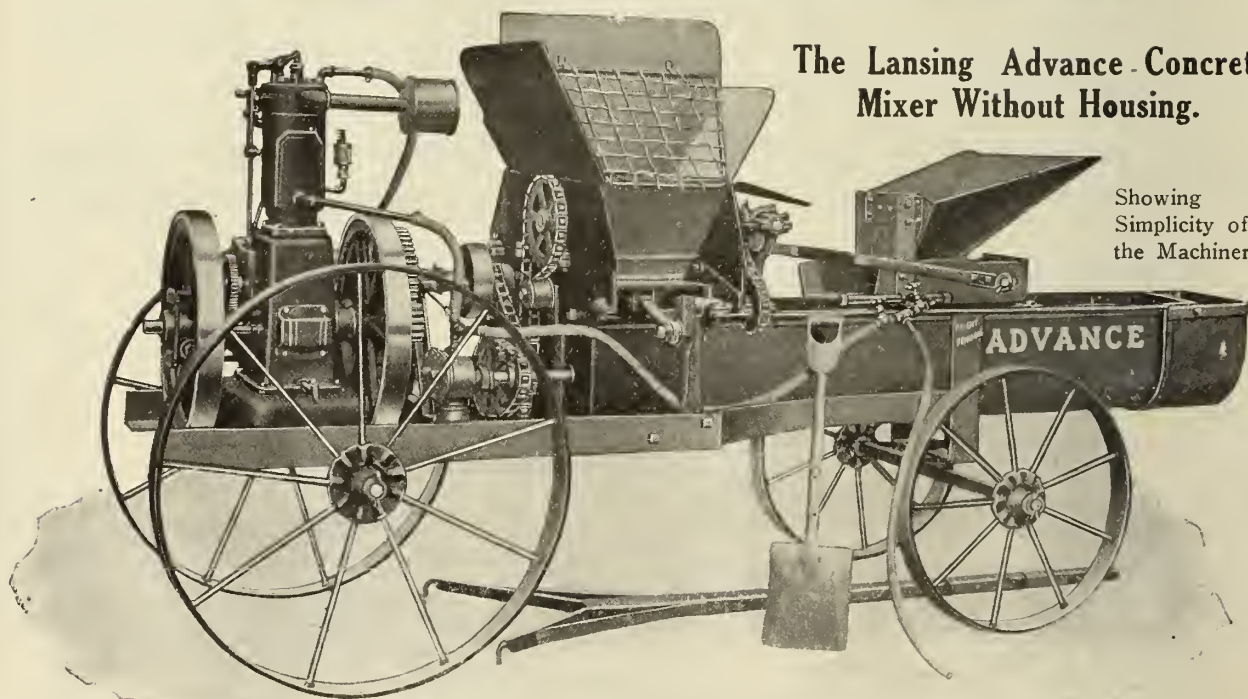
Throw away the hoe and get better mortar.

With this machine two men will produce more mortar than a crew of six can by hand.



The Lansing Advance Concrete Mixer Without Housing.

Showing
Simplicity of
the Machinery



The Advance Concrete Mixer will do the work with one handling of the materials. This means shovel the sand, gravel or crushed stone into the bins and the machine will measure, mix, wet and place the concrete into the wheelbarrows, and many times into the forms. Therefore, you have saved at least five handlings of the material over hand mixing. If six men will put in five or six hundred square feet of sidewalk by hand, six men with the ADVANCE MIXER will put

in 1,500 to 1,800 square feet in the same length of time, therefore saving the contractor \$18.00 to \$24.00 per day on labor.

These goods are kept in stock at our warehouses named below.

Write for catalog J. M.

LOOK FOR US AT CONCRETE SHOWS

LANSING-COMPANY

Formerly Lansing Wheelbarrow Co.
37 Forest Avenue, LANSING, MICHIGAN

WAREHOUSES:

Kansas City
Minneapolis
St. Paul

923 Mulberry St.
330-334 North First St.
51 East Fourth St.

New York City
Philadelphia
Chicago

102 North Moore St.
Corner N. American and Willow St.
169 West Lake St.

In writing Advertisers please mention CONCRETE.



“Do you know why the plants operating my machines are making money? I’ll tell you——”

Herman Besser

Thirty years ago I came to Michigan on my way to the timber lands in the North. I stopped at Alpena and have been here ever since. Nine years ago I helped organize the Alpena Portland Cement Co. and for four years was its president. I began to experiment with concrete machinery. In those days concrete machinery was clumsy and expensive.

I had many failures. My experiments cost me lots of money. My boy Jesse—the tall fellow; you’ve seen him at the cement shows—helped me. After years of experiment we put out our first machine. I machined some of the castings myself. We did the designing together.

Little by little our plant has grown until it has the distinction of making the largest line of concrete machines ever patented by one concern. We design our machines in our own drafting room. We make our castings in our own foundry. We have a big machine shop full of expensive machinery. And we’ve built this industry up by adding one cent to another, one unit to the last one.

Maybe you think this autobiography has no bearing on the quality of concrete machinery?

Here is the point:

The man who buys the first machine of any one Besser type gets for a hundred dollars or so a machine that has cost me thousands of dollars to produce. Before we ever pick up a drafting pen, we conduct long experiments to make sure that the principle of the new machine is right. These experiments extend over years. I am experimenting now on a new machine that you won’t be able to buy for five years. And when the design is complete, I oversee every step in the manufacture of the machine.

I’m out in my plant every day in my overalls, working with my men. I don’t travel much. I stay on the job and see to it that the first thing put into every Besser machine is quality.

I’m just that proud of my work.

Many new machines come out every year. The great majority are thrown together in a hurry. I can’t do that. My business is too big for me to run the risk. I spend time and money and labor on every machine I originate. When it is complete it

must be right—it has cost me so much before I’ve sold one that I can’t afford to have it go out with a question mark on it.

I have some strong ideas on concrete work.

I believe a dry-tamp concrete block is worse than none at all—it hurts the whole block business.

I don’t believe you can scoop a measure full of concrete into a mold and *press* it into a good tile or a good brick, *unless you take care of the surplus concrete.*

I believe that the only way to make concrete products automatically is to put more concrete in the mold than you’ll need, tamp it hard and thoroughly—churn it and knead it under the tamper and then scrape off the superfluous material.

You’ll find these ideas incorporated in all my machines.

And these are a few reasons why plants operating Besser machines are making money. I’ve *got* to have them prosper, else I can’t prosper.

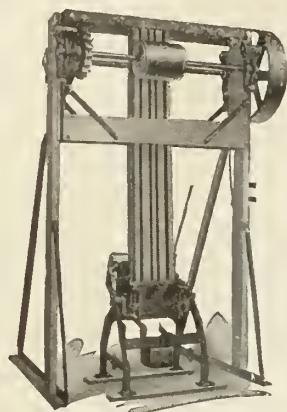
I personally stand back of every machine I put out. If you’re not satisfied with what you buy of me, say so and we’ll trade back. I won’t bicker with you. You ship me the machine and I’ll return your money.

You can buy cheaper machinery than I make—machinery that’s lower in *first cost*. But you can’t buy, at any price, machinery that will make concrete products as fast and as good as my machines will.

If, after reading the three following pages, you have anything to say to me, I want to hear it.

The next page will interest you—read it.

Herman Besser



Besser Face-Down Block Machine working under a Besser Automatic Tamper—the Tamper will fit ANY machine.

Plain Talk About Concrete Machinery

You've heard a lot about hand-power block machines, their core action, their speed and their variety of output.

Now figure this—if you are in the block business to make money, to make a good product that will advertise itself and increase your business—you want a block machine that will make hard, dense blocks, fast. Labor is your biggest item of expense. Get a machine with big output and if the product is good your business will grow.

Concrete that isn't made wet is worthless. You can't water the block so well after it is made as you can while you are making it. In a block machine which releases the cores while the block lies on its face, or on its back, you can't use a wet mixture—the concrete can't support itself over the core openings. Try it and see.

My Face-Down Block Machine

Was designed with all these things considered. It is the only face-down block machine in whose operation wet mixture and great speed are combined.

It is the only face-down block machine which withdraws the cores vertically, and automatically with a positive lever action AFTER the block has been turned over.

It is the only face-down block machine on which the block is turned over by a counterweight and not by main strength and awkwardness.

It is the only face-down block machine which makes a continuous-air-space-block, tied with metal ties, in addition to the regular hollow block in unlimited variety.

With my block machine ready for business, you tamp in your facing, with the backing, draw the cores in horizontally, tamp in the rest of the concrete, strike it off, touch the counterweight, thus turning the block up, withdraw the cores vertically by a lever, this action carrying the completed block out to you on its pallet. When the block is removed, you close the mold box and, without another motion, your machine is in the same position in which it started—NOT A LOST MOTION ANYWHERE.

If you have a block machine that isn't making enough money for you, or if you're just buying a machine, write me today. Let me send you my book on profitable block making. It will tell you how to make money in the block business—how you can extend your business by adding my automatic block tamper when you want to increase your output.

My power tamper will fit any block machine.



THE FASTEST HAND POWER BLOCK MACHINE MADE.



The First Thing Put Into

"As Starret, the tool man says, if you can find any better concrete machinery than I make, buy it."

Herman Besser



Besser Regular Power Tile Machine.

Regular Power Tile Machine

There are two very important features to my automatic tile machine—

In the first place, it feeds itself automatically. The mixer should discharge directly into the feed hopper. This hopper measures the batches automatically and the concrete is carried up above the tile mold by a cup conveyor. This saves one man in your plant. You don't need a man to shovel the mix from the floor into the conveyor cups—the machine measures the batches before the concrete reaches the conveyor at all. Saving one man means adding \$1000 a year to your profits.

In the second place, there's no revolving table to jar and jerk. The packer doesn't slide up and down. It just keeps revolving and the mold comes down over it, is filled and rises again, the packer packing and troweling the tile.

My Tile Machine Book is full of information about tile manufacture.

I guarantee the Besser Power Tile Machine to make more and better tile per average day's run, with less labor and expense, than any other method or machine.

Large Sewer Tile Automatically Tamped

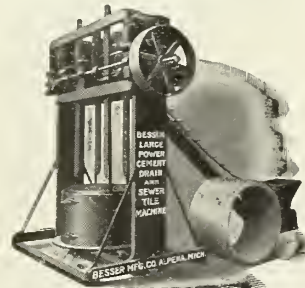
My Large Power Tile Machine, shown in the picture in the corner of this page, will make concrete tile of any size from 8 in. to 3 ft. in diameter, in 24 in. or 30 in. lengths, bell, plain or socket ends.

The mold is fed by the conveyor chain from the automatic feeding boot, as in the regular drain tile machine.

The molds are of heavy steel, sitting in cast iron rings. The mold revolves under four steel tampers which deliver 450 blows of 400 lbs. each, every minute. No cranks, eccentrics, sprockets or chains—the tamper bars are forced down as far as the concrete already tamped will allow. The tampers are under perfect control.

One man operates this machine and has nothing to do but pull levers. The machine feeds itself, tamps the tile automatically and trowels the top. For bell end and plain end tile, no pallets are required.

The capacity of the machine depends solely on how fast you can carry the tile away. Even in a green state the tile are so solid that molds may be removed immediately. Three molds will keep the machine running. Our book on sewer tile gives detailed description of the machine and has a lot of valuable data about the cost of tile manufacture and the market to be found for the product.

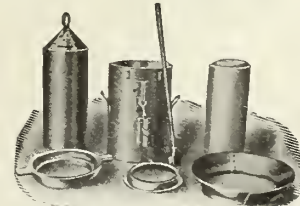


Besser Large Power Tile Machine.

Herman Besser, President
Besser Mfg. Co.
102 12th St., Alpena, Mich.

Hand Tile Molds

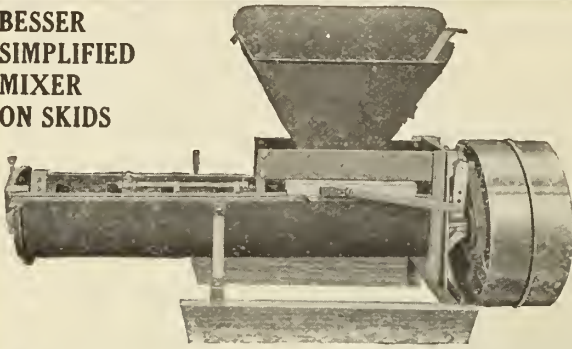
Besser Hand Tile Molds make a product from 6 in. to 4 ft. in diameter. The core contracts by the simple action of lifting it and expands automatically as it is lowered into the empty mold. Mold is in two pieces, easily handled. Write for prices of the best equipment made for the manufacture of cement tile by hand.



Besser Hand Tile Molds.

Besser Machines is Quality

BESSER SIMPLIFIED MIXER ON SKIDS



Simplified Mixers simplify your mixing

I've used a great many concrete mixers in my time. I built my Simplified Mixer to protect my other machines—I found that plants equipped with my tile and block and brick

machines were weak on mixers. So I built a mixer which, equipped for tile or block plant as shown in the picture at the left, hasn't a chain or a sprocket or a spring or a gear.

Mounted on trucks, as shown below, it has just one chain, the direct drive from the engine.

The mixing trough is extra long—7 feet. The paddles are strung on a square shaft—no bolts to fuss with. The hoppers are low, with wide bottoms. Agitators keep the materials feeding through the hoppers, which proportion accurately and positively.

Two levers control the machine. One is used to stop the whole mechanism; the other stops the feed only and allows the mixing paddles to continue.

On outside work or in a permanent plant, my Simplified Continuous Mixer will save you money. There's nothing about it to get out of kilter and it certainly does turn out the concrete.

HERE ARE SIXTEEN CATALOGS—

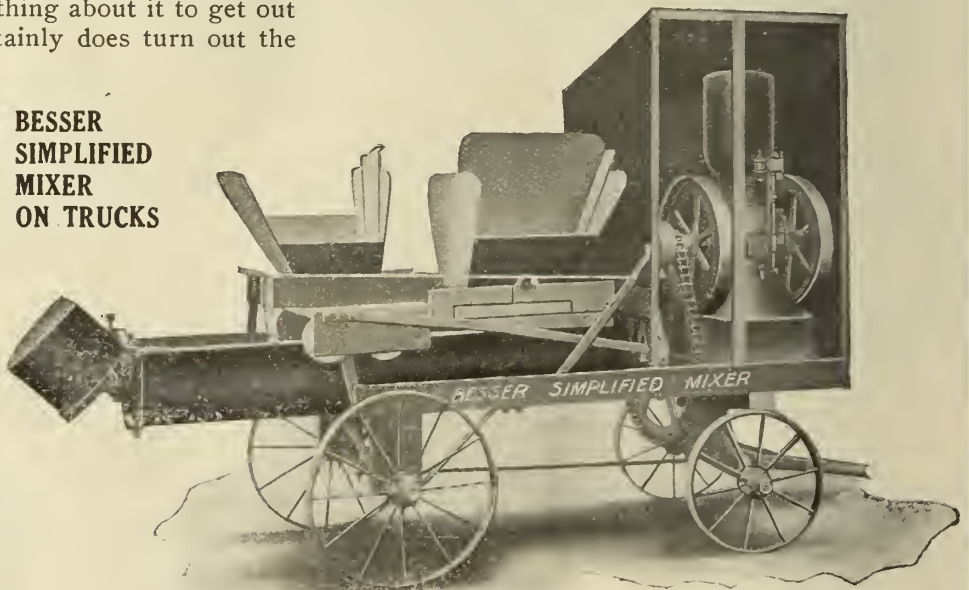
What ones do YOU want?

- 1—Power Tile Machines.
- 2—Hand Tile Machines.
- 3—Sewer and Culvert Forms.
- 4—Continuous Mixers.
- 5—Face Down Block Machine.
- 6—Power Block Tamper.
- 7—Hand Brick Machines.
- 8—Ornamental Molds.
- 9—Sill and Cap Molds.
- 10—Cars, Tracks, Crushers, Engines.
- 11—Fence Post Machines.
- 12—Sidewalk Tile Machines.
- 13—Cement Pulverizer.
- 14—Power Brick Machine.
- 15—Batch Mixer.
- 16—Large Power Tamp Tile Machine.

Name
Address
City
State

Herman Besser, Pres't, Besser Mfg. Co.,
102 Twelfth St., Alpena, Mich.
Dear Sir:—
Please send me, without charge, booklets checked on this list. This does not obligate me to buy.

BESSER SIMPLIFIED MIXER ON TRUCKS



Automatic Tamping Power Brick Machine

Makes 30,000 to 60,000 perfect brick per day. A whole brick plant in itself. Neither the material nor the product is touched by hand from the mixer to the curing yard.

Hand Brick Machines

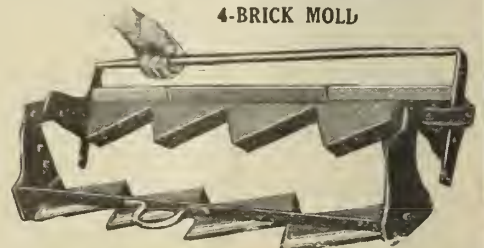
A full line of brick machines for making cement brick by hand. Veneer blocks made on the same machines.

Steel Culvert Molds

My culvert forms may be handled easily by two men. Set up for pouring invert and crown simultaneously, the only sane way of pouring a culvert.

30-Day Special for Contractors

4-BRICK MOLD



Makes four, uniform, light ones. No dividing plates. Made for the building contractor who wants to make a few brick for porch work and the like. To all who order this mold, mentioning this advertisement, within 30 days, I'll make the price \$35.00. The machine regularly sells for \$50.00. Order one. If you don't like it after trying it, send it back at my expense and I'll refund your money. Order now, before you forget it.

HERMAN BESSER, Pres't.

BESSER MFG. CO. 102 12th St. Alpena, Mich.



We Will NOT be at the Cement Show

Come to the Lehigh Parlors at the Congress Hotel (Annex) Feb. 21-28

We Will be Glad to Discuss Any Cement Problems You May Have

ALL ARE WELCOME

Lehigh Portland Cement Company

11 Mills—11,000,000 Barrels Capacity
8 Branch Offices

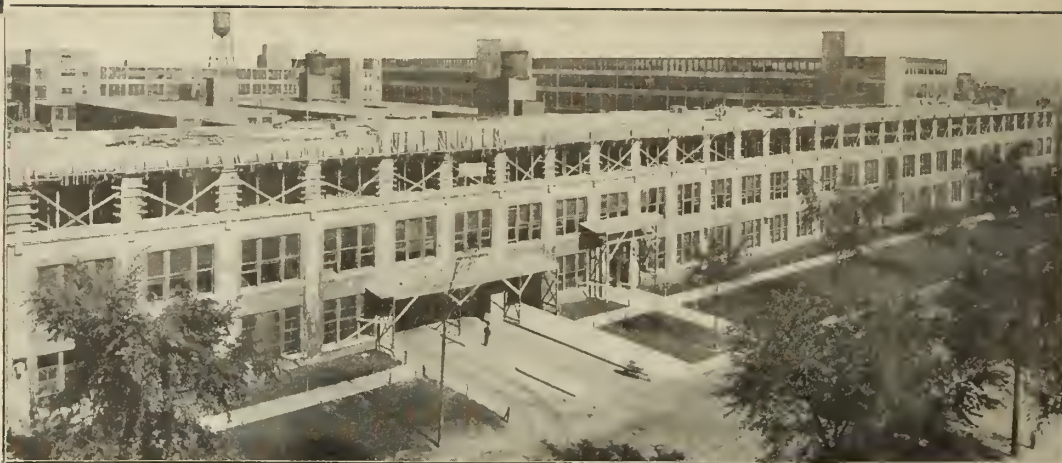
Western Office, Chicago

Eastern Office, Allentown, Pa.

In writing Advertisers please mention CONCRETE.



Packard Motor Car Co.'s
Plant, Detroit, Mich.
Reinforced Concrete Building
500 Feet long, 60 feet wide
20,000 barrels PENIN-
SULAR PORTLAND
CEMENT USED in its
construction.



USE Wabash Portland Cement

Best for All Kinds of Concrete Work
Great Strength and Durability. Fine Color and Uniformity

Sold by the Best Dealers

Wabash Portland Cement Co.

Phone Main 859

1824 Ford Bldg., DETROIT

WOLVERINE PORTLAND CEMENT

More Than Nine Years of Satisfaction!

Unexcelled for Strength and Uniformity

Manufactured by the

Wolverine Portland Cement Company

COLDWATER, MICHIGAN

Write for Prices and Booklet.

W. E. COBEAN, Sales Agent, COLDWATER,



Why you should buy our Cement

It is exceptionally uniform in color.

It is ground fine—over 96% passes a 100 mesh sieve.

It is made under the COWHAM SYSTEM—a guarantee of worth.

It is made in large quantities—on good railway connections—insuring prompt shipments.



Write for the Northwestern Prices

When you are in the market for cement give us a chance to figure with you. Our cement has great strength—you should use it, and if you will write us we are sure we can get together.

Write for Our Book on Cement.

Northwestern States Portland Cement Co.

(COWHAM SYSTEM)

Works and General Offices,
MASON CITY, IOWA,

U. S. A.

CONCRETE

VOLUME XII

MARCH, 1912

NUMBER 3



Use "Chicago AA" Portland Cement

"THE BEST THAT CAN BE MADE"

Our booklet, descriptive of the "Chicago AA" process, is free to cement users. Write for a copy today.

CHICAGO PORTLAND CEMENT CO.,
Dept. 86, Chicago, Ill. J. U. C. McDANIEL, Sales Mgr

Present Output 1,500,000 barrels annually

ALPHA PORTLAND CEMENT

The Recognized Standard American Brand



A strictly straight Portland which for uniformity and general excellence cannot be surpassed. It is absolutely pure and unadulterated. Contains no furnace slag or other by-products.

BEST IN THE WORLD FOR SIDEWALKS
Write for our handsomely illustrated book, sent free.

ALPHA PORTLAND CEMENT CO.
5 Centre Square, Easton, Pa.

BRANCH OFFICES: Board of Trade Bldg., Boston; Hudson Terminal Bldg., New York; Builders' Exchange, Buffalo; Oliver Bldg., Pittsburgh; Marquette Bldg., Chicago; Harrison Bldg., Philadelphia; Builders' Exchange, Baltimore; National Bank Bldg., Savannah.

Call on

"CONCRETE"

at the

Kansas City Cement Show

Booth No. 3

"LEHIGH" PORTLAND CEMENT

See Lee-Hi inside the back cover.

Recommended for high-class engineering work. High tensile strength. Finely ground, light and uniform in color.

LEHIGH PORTLAND CEMENT CO.
Head Office, ALLENTOWN, PA.

Main Western Office: 521-532 Peoples Gas Building
CHICAGO, ILL.



THE BEST FOR ALL USES



**WM. G.
HARTMAN
CEMENT
COMPANY**



**Sole Selling
Agents
PHILADELPHIA
PA.
Real Estate Trust
Building**



ILLUSTRATED CATALOGUE SHOWING WORK DONE WITH THESE CEMENTS SENT FREE UPON REQUEST

An Announcement

Mr. Concrete Products Manufacturer:

What feature of your plant gives you the greatest satisfaction? Whether it is a patented machine, a home-made device or a system of procedure, a new method or plan of arrangement—no matter what this labor-saving, money-saving or time-saving feature is, **CONCRETE** would like to know what it is. *There isn't a man in the industry who hasn't some good idea valuable to others.*

You have a good idea

Tell the Editors of CONCRETE

Detroit, Mich.

CONCRETE

DETROIT, MICH

CONCRETE PUBLISHING COMPANY

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WHITE
PORTLAND
CEMENT
STAINLESS



SANDUSKY
PORTLAND
CEMENT
COMPANY



Residence of Mrs. J. M. Kuyherdall, Denver, Col.
Medusa White Portland Cement used for exterior finish

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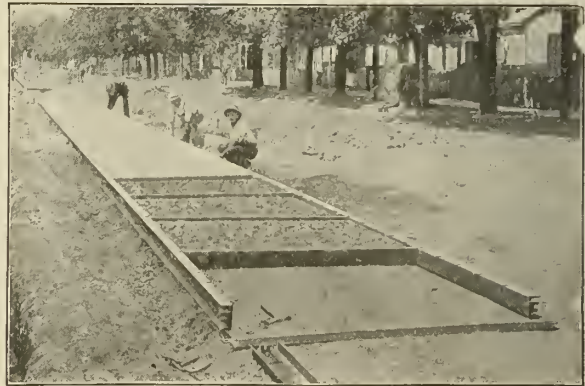
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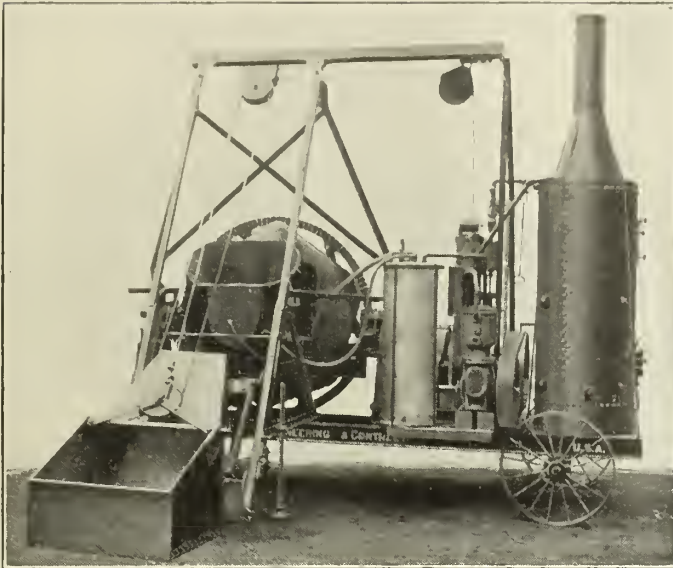
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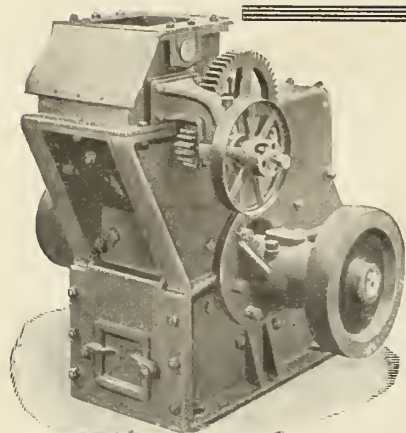


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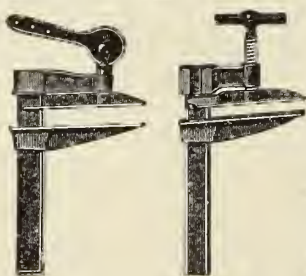
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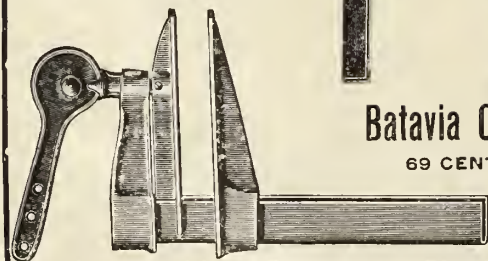
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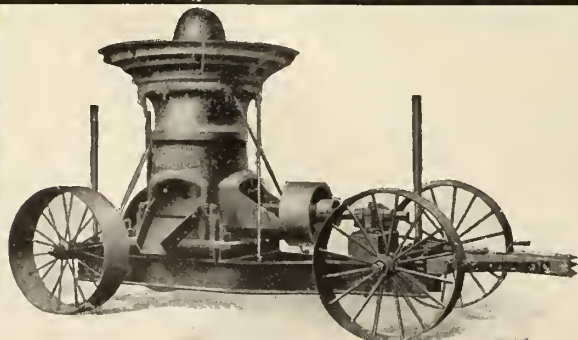
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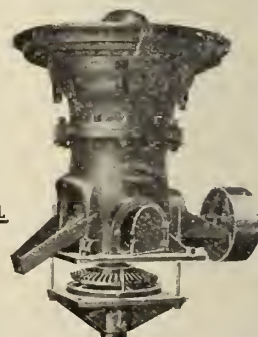
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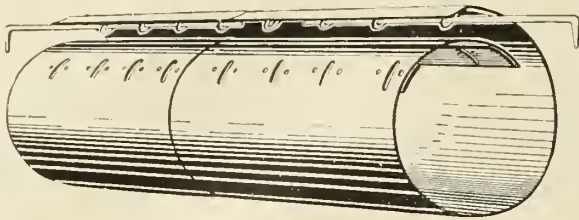
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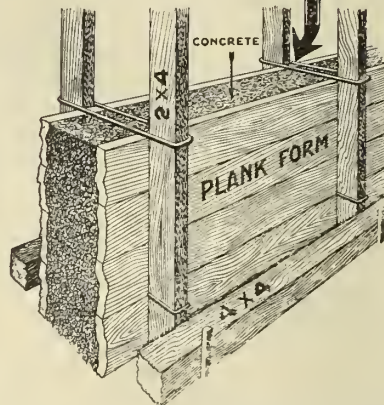
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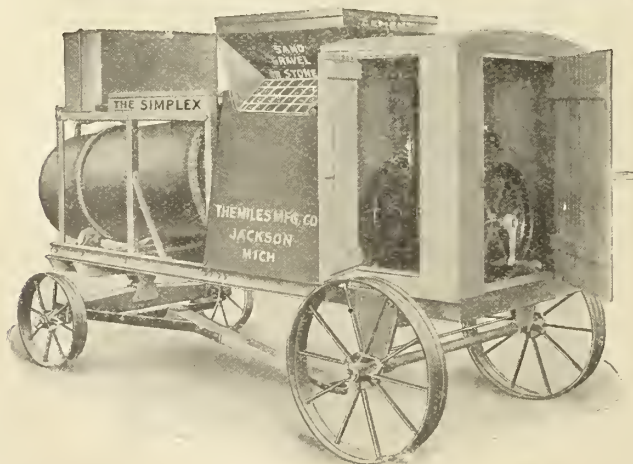
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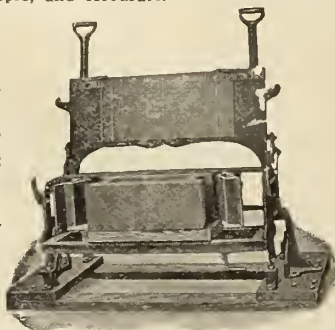
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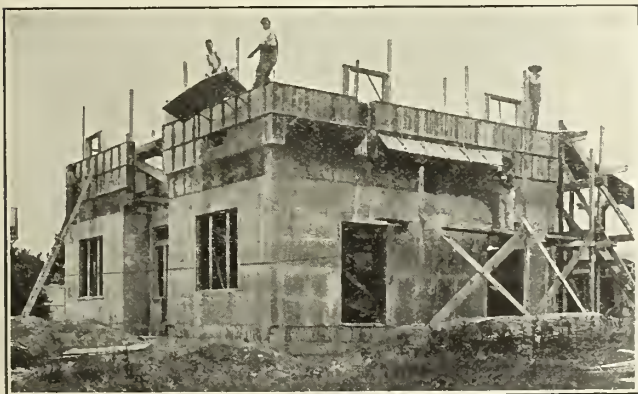


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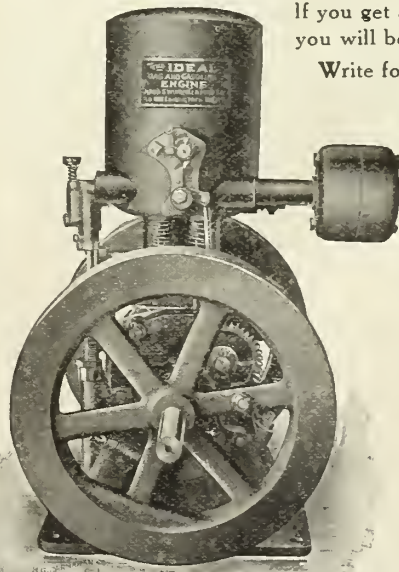
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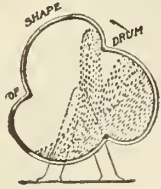
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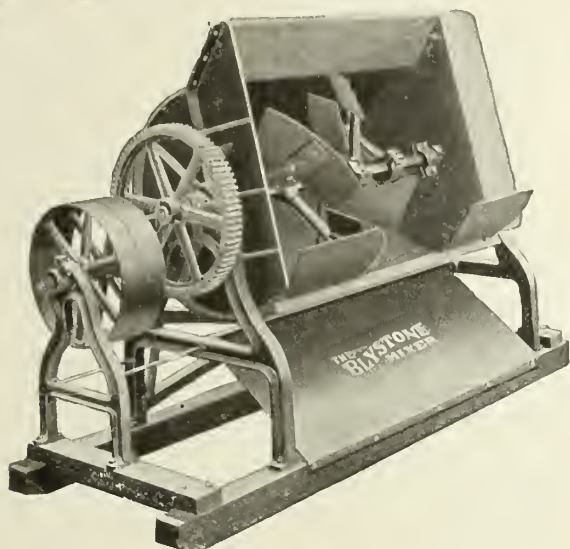


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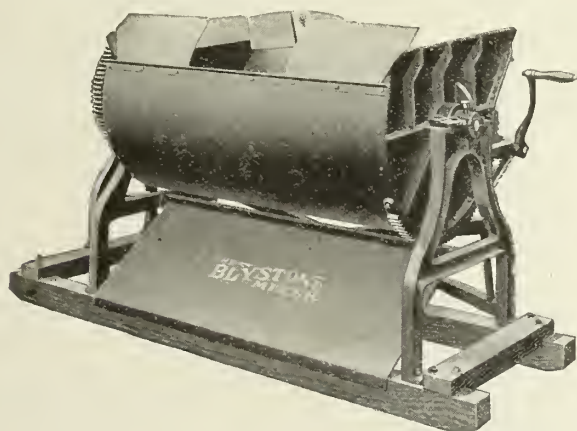
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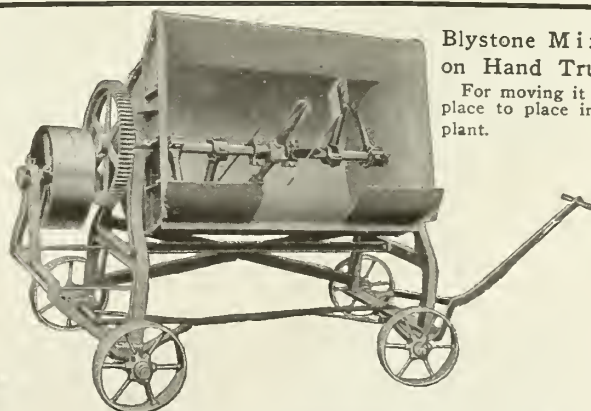
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For moving it from place to place in the plant.

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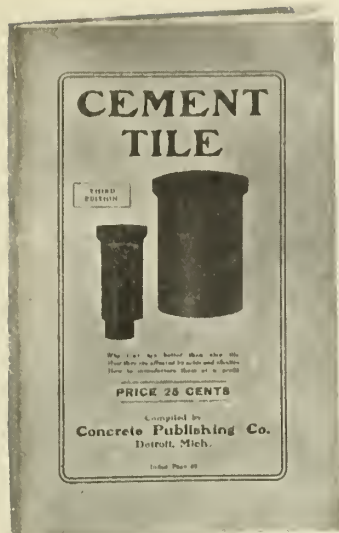
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Write for information and prices. Don't delay. Do it today.

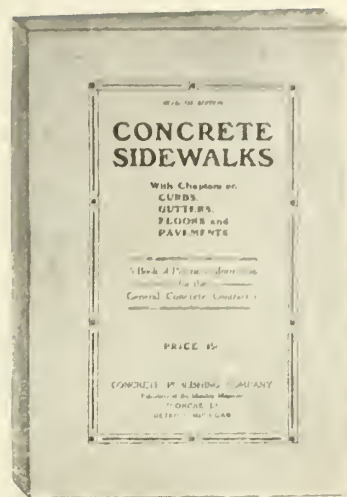
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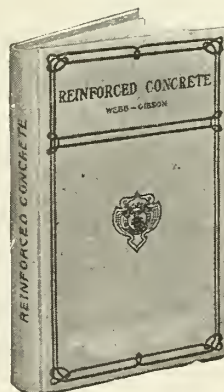
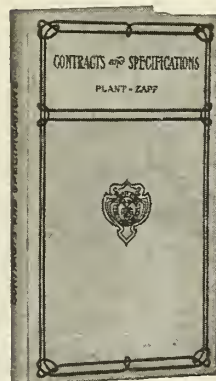
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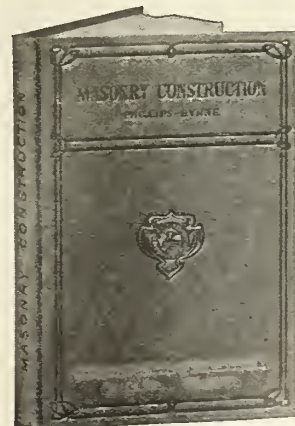
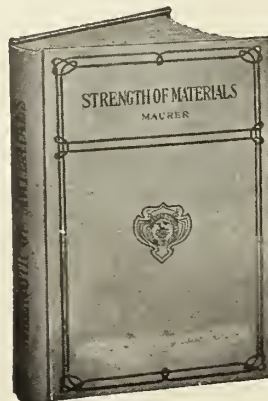
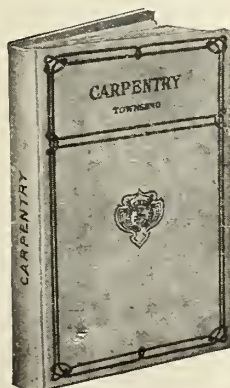
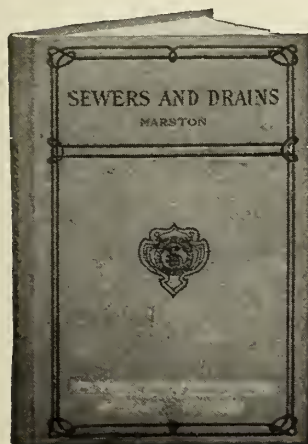
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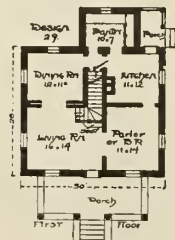
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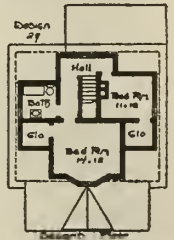
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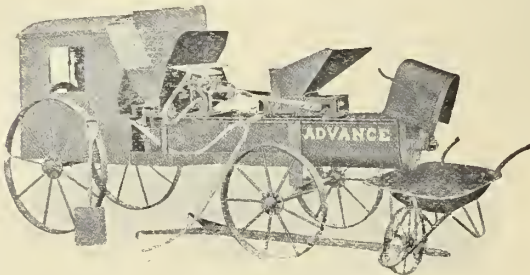


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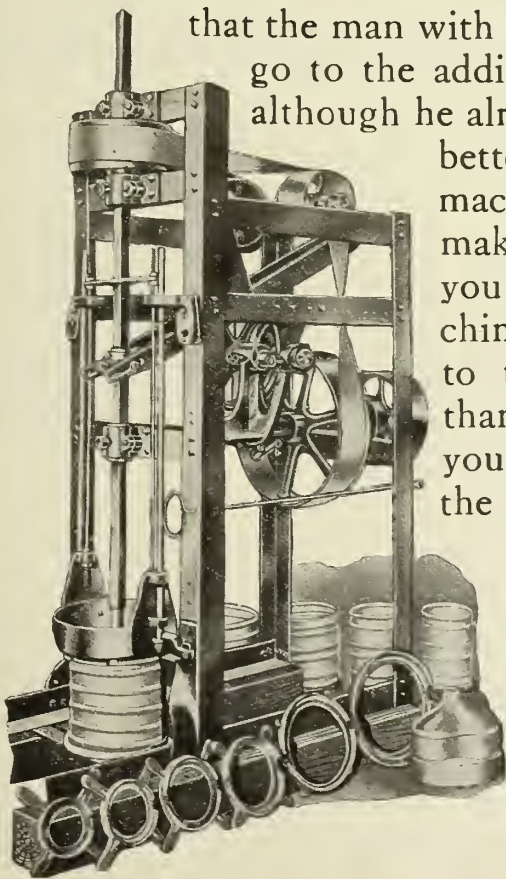
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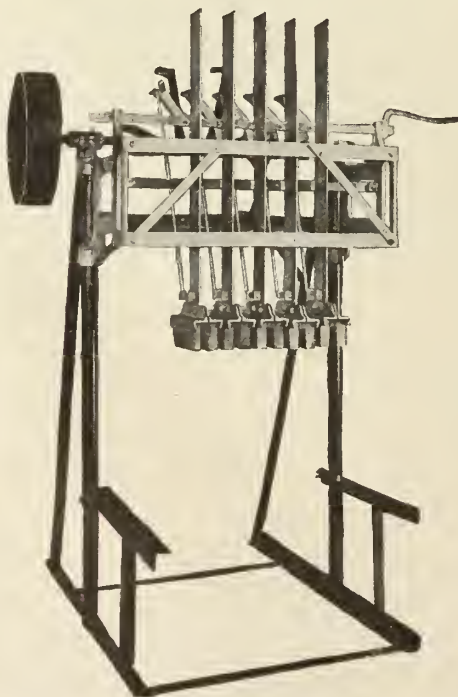
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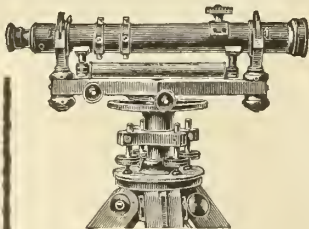
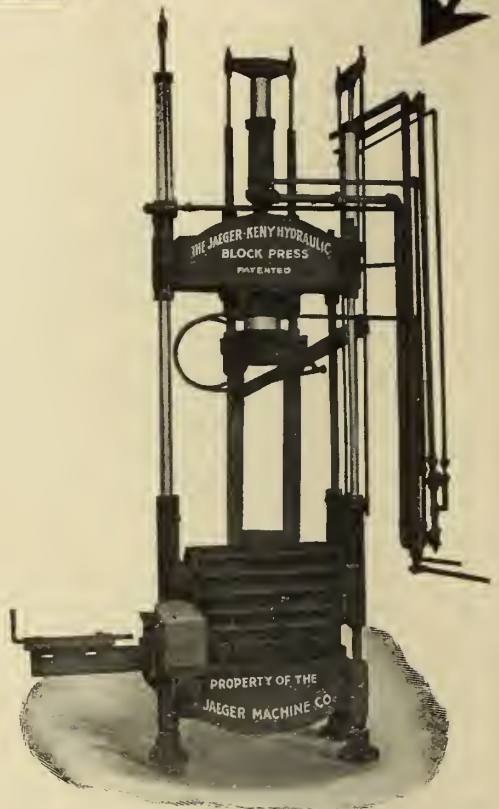
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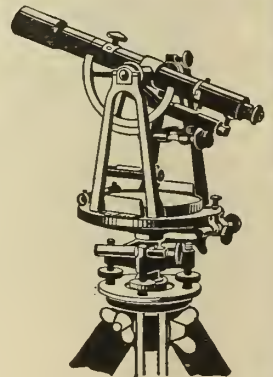
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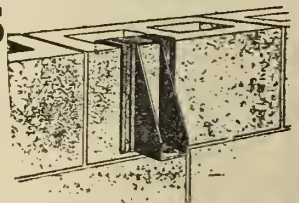
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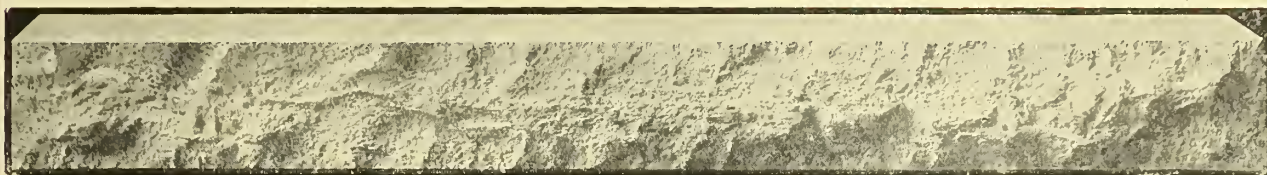
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For calking up around windows, doors, roofs, skylights, vault lights and cornices

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And we will make this saving for you regardless of the mixer you are now using

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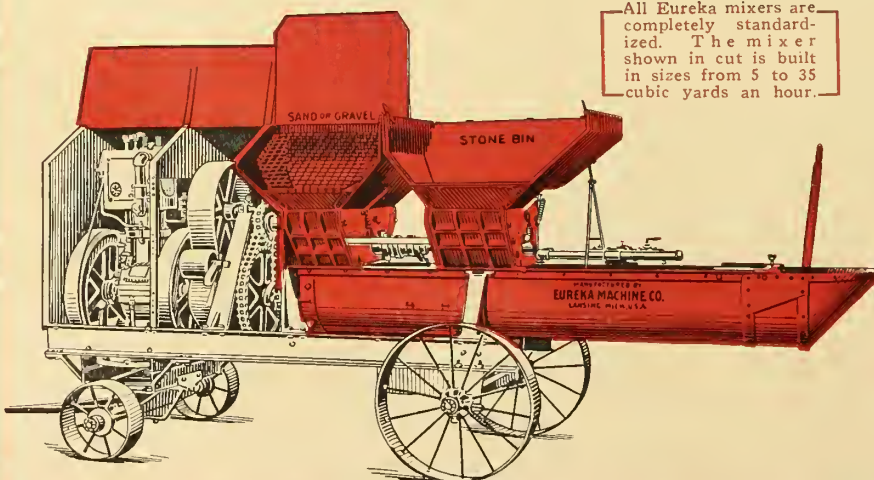
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Referring to the call of your Mr. Ferguson upon the writer some days ago, and confirming the verbal statements made by the writer to him with regard to the operation of your Eureka Cement Mixing Machine being used by one of our clients, the Riverside Paint Works, of this city, the writer begs to state that while in the past he has always specified the use of batch mixtures, yet the exceedingly good showing made by your continuous mixer has convinced him that equally as good results can be obtained by the use of your continuous mixer as any batch mix the writer ever saw. In fact, a most careful check upon the material used shows that the percentage of mix does not vary appreciably. This in itself is an exceedingly great advantage, as there is always an opportunity in batch work of the contractor's employees leaving out a bag or two of cement. This cannot be done when your machine is used.

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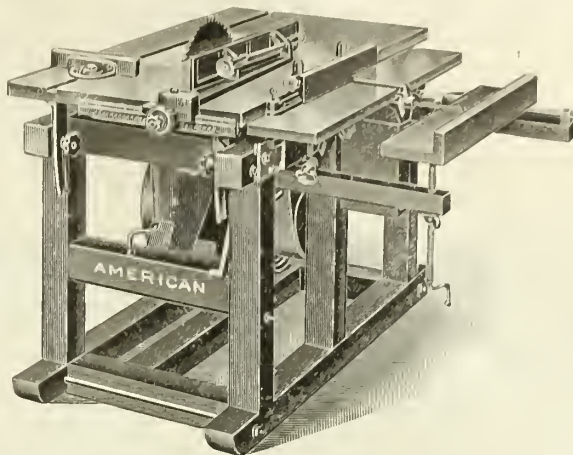
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Contractors' Portable

Variety Wood-Worker



Study this illustration—read the description herewith—consider the possibilities of this new machine for your work—and decide for yourself whether you can afford to be without the manifold advantages of the “American.”

The “American” Contractors’ Portable Saw Bench was, and is, the best bench ever offered to a concrete contractor. The “American” Contractors’ Portable Variety Wood-Worker marks another great forward stride in bringing mill facilities and advantages to the concrete job.

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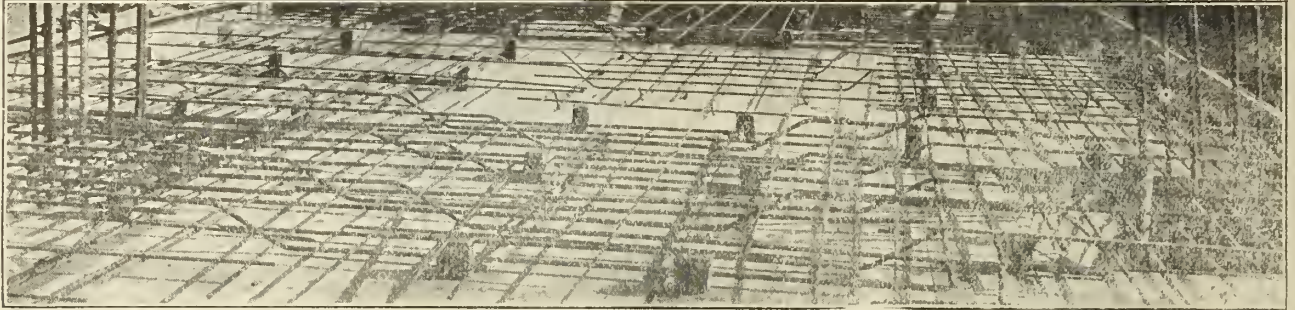
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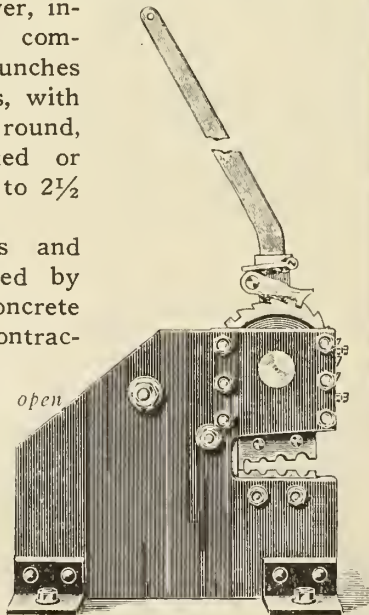
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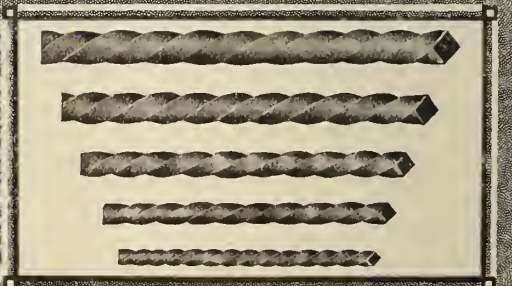


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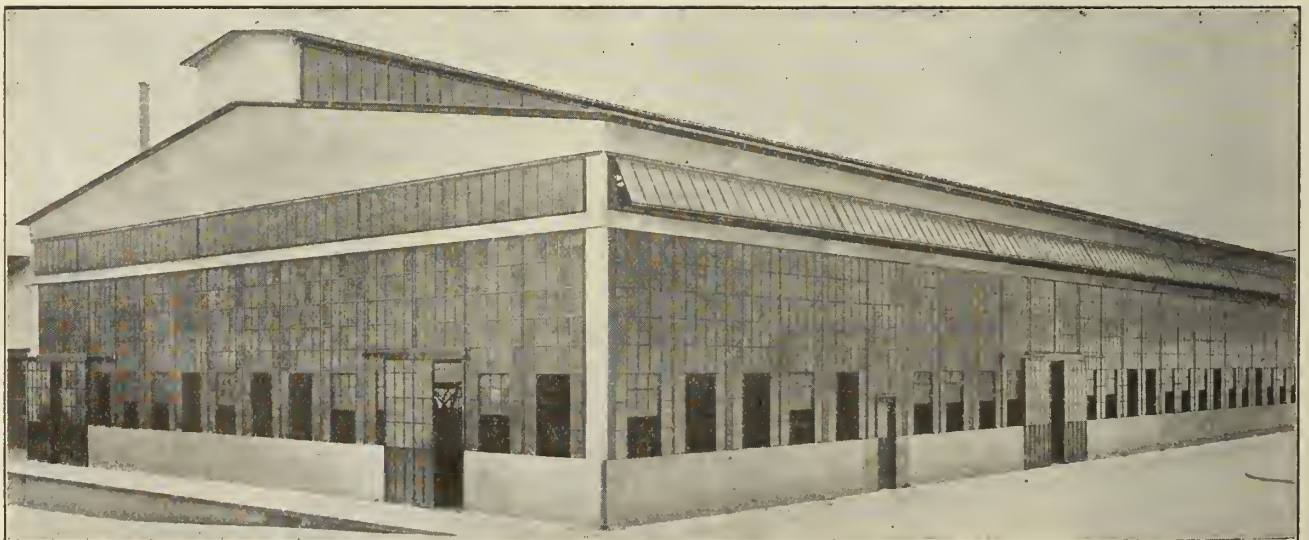
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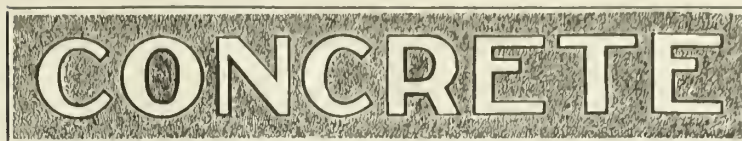
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Uses of Portland
Cement.



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Concrete Organizations, Officials and Conventions

National Association of Cement Users, Harrison Bldg.,
Philadelphia, Pa. Convention, Kansas City, Mo., March
11-16, 1912.

Cement Products Exhibition Co., 72 West Adams St.,
Chicago, Ill.; Secretary-Treasurer, J. U. C. McDaniel, 108
La Salle St., Chicago, Ill.

Kansas City Show, Convention Hall, Kansas City, Mo.,
March 14-21, 1912.

Northwestern Cement Products Association, J. C. Van
Doorn, Secretary, Security Bank Building, Minneapolis,
Minn.

Iowa Association of Cement Users; Secretary, Ira A.
Williams, Ames, Ia.

Nebraska Cement Users' Association, Columbus, Neb.;
Secretary-Treasurer, Peter Palmer, Oakland, Neb.

Oklahoma Cement Users' and Contractors' Association;
Secretary, D. C. Patterson, 336 Bassett Bldg., Oklahoma
City, Okla.

Concrete Machinery Manufacturers' Association; Sec-
retary, Le Roy A. Kling, Cedar Rapids, Ia.

Canadian Cement and Concrete Association; Secretary,
William Snaith, 57 East Adelaide St., Toronto, Ont.



CONCRETE SILOS

—WITHOUT FORMS—

The illustration at the left shows a concrete silo erected under the supervision of the Kansas State Agricultural College.

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Ceresit is catalogued in Sweet's Index.

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Ceresit is a paste that is put into the water before the water is used in mixing concrete or cement mortar. The water carries the Ceresit into every portion of the mixture and uniformly permeates the entire mass.

CONCRETE

Vol. XII

MARCH, 1912

No. 3

Editorials

IF YOU can't sing the Missouri "dawg song" you'd better learn it. It'll come in handy when you attend the Kansas City Cement Show this month.

* * *

IN THE mind of the man who has watched the steady, healthy progress of concrete in the Southwest, there is no doubt of the success that will attend the First Annual Kansas City Cement Show.

* * *

IT WAS a noticeable fact at the Chicago Cement Show that firms manufacturing concrete machinery that requires "only a sack of cement and a pile of sand by the river" to enable the operator to make his everlasting fortune, were not among those present.

* * *

WITH all due respect for Mr. Ruoff, quoted in this issue of CONCRETE with reference to concrete in imitation of stone, we must take issue with him. There may be special cases like the reproduction of old, disintegrating stone statues for a German palace, which Mr. Ruoff mentions, in which the idea of *imitation* is to be condoned. Imitation is distasteful, however, *because it is imitation*. Concrete has qualities of its own which it is more desirable to retain in any piece of construction than any false qualities obtained in an effort to counterfeit another material. The artist and the architect are extremely sensitive in this regard and justifiably so. Truth is an important element in architectural design, and if the whole fabric of a structure is a falsehood—even though so successful a falsehood as to be undiscovered, the designer is out of sympathy with the work. Concrete being plastic is doomed sometimes to an unworthy subjection so that it cries out at us in strange shapes and textures in which it never was meant to be. Let every craftsman in concrete seek above all to produce good concrete and show it to us *in terms of concrete*, and then all those who specify materials will learn its superior advantages.

* * *

IT APPEARS that the city of Pittsburg is handicapped in its efforts to provide a building code because the Pennsylvania legislature reserves for itself power to regulate building construction. Edward Stotts, chairman of a commission of architects, builders and engineers, which is devising a code, says: "The Commission has a very narrow field for operation. The Pennsylvania legislature has the authority, and is exercising it, to provide building restrictions. Many general conditions which the legislature prescribes do not meet the requirements of a city of the importance of Pittsburg." Isn't there some advantage in the fact that the legislature has the authority in these matters? It is true that the local Pittsburg Commission is at a disadvantage in formulating the municipal building code, but would it not be better for building conditions generally if state legislatures adopted general regulations to meet

the requirements for safety of both the villages and the cities?

* * *

Fire losses and the cost of fire preventions in the United States amount annually to \$450,000,000. If the buildings in the United States were as nearly fire-proof as those in Europe, the annual cost of fire and fire protection would be only \$90,000,000. The cost of fires each year in this country is one half the cost of all the new buildings erected in a year.

* * *

For the enlightenment of those who afforded all of us some merriment with their jests about concrete furniture, let it be set down to be of record—that a library table and some chairs done in concrete in mission style were on exhibition at the Chicago Cement Show. We do not recommend that you cast out the leather upholstered pieces, the mahogany and the rush bottoms and straightway instal this furniture eternal. But the concrete furniture *has been made*, and many found its plain and sturdy lines quite pleasing. Goodness knows, it should be enduring!



The house shown in the illustration is built of Ideal concrete block; has a concrete shingle roof and cost \$2,500. F. W. Fais, Spencer, Ia., is the owner, architect and builder. The house is 28' wide and 32' deep. It is built of 8"x8"x16" block, 2,173 of which were used at a cost of 14c each. There is a full basement 7' 3" in the clear with block partition walls for furnace, vegetables, coal room and laundry. The house also has a 100-barrel concrete cistern. There are seven rooms besides a bathroom which is 8' 6" square. The first story walls were furred inside, then plastered, and the second story walls were plastered direct on the block. The house is equipped with a hot water heating apparatus. Block used were horizontally and vertically tooled and heavy panel block were used for trimming. All block were faced $\frac{3}{8}$ " to $\frac{1}{2}$ " in depth with a 1 to 2 facing material. The foundation is 12" thick.

Booth Number 32 is CONCRETE's at the Kansas City Cement Show.

Progress of a Year in Concrete Seen at the Chicago Show

Visitors who attended the Chicago Cement Show held Feb. 21-28, in the Coliseum, Chicago, were generally impressed by the improved character of the exhibits. While there were hardly as many firms represented as there were last year, we believe that the show was a better show, all things considered.

The engineer, architect or contractor who came to Chicago with the idea of learning just what progress had been made in concrete construction in a year's time, found much food for thought. The exhibitors displayed many new and improved pieces of equipment for handling concrete and allied materials. Some exhibitors were there to explain new methods of doing concrete work that would cut costs and improve product. So the interested visitor could glean valuable information by making a trip around the exhibition hall.

From the standpoint of the exhibitor, we believe there is no question that the show was successful. The general impression that 1912 is to be a banner year in the construction field probably had its effect in inducing contractors to place orders for machinery and supplies.

The decorations which made the show so attractive to the general public were much like those used at the New York Show. The booths were constructed of the same concrete-like material which was used in New York, it having been shipped from the Eastern show by Installation Manager M. E. Gordon. When we learn that practically all of the exhibit equipment was loaded bodily on a freight train in New York, shipped to Chicago and erected again in the Coliseum, we are impressed with the magnitude to which these national cement shows have grown. After the Chicago show closed not only was the show equipment loaded on a special train but the actual exhibits of those firms who will be represented at the Kansas City show were included. The whole show is practically shipped on a special train, to be re-assembled at the Convention Hall in Kansas City.

Manager J. B. Beck of the Cement Products Exhibition Co., which runs these national cement shows, expressed himself as highly satisfied with the Chicago show. The exhibition was produced with much less trouble than ever before and exhibitors and visitors alike had good words to say for the general plan under which the show is run.

In its February issue CONCRETE announced its willingness to purchase a few copies each of the issues of CONCRETE of January, February, March, May, July, August, October and November, 1911, at special premium prices. So that no one may be put to any inconvenience in writing about such magazines, it is announced here that enough of each of these issues have been received.



Garden Vases, Pergola and Benches of Concrete

Special Pieces in Concrete, Cast and Molded

Some Good Work Being Done by Products
Manufacturers Giving Attention to Detail

The special uses of concrete in which its decorative value is the thing most sought have frequently been mentioned in CONCRETE. The illustrations on this and the next page show some of the special uses to better advantage than can be done in mere description. Some of the work illustrated was done by the Ruoff Construction Co., Philadelphia, Pa., and some of it by the National Stone Mfg. Co., Minneapolis, Minn. Julius Ruoff, of the former company, writes CONCRETE that by taking special pains in making ornamental objects of concrete and also in taking special pains in curing these objects, he has built up a lively trade in such things as garden vases and so on, in his home city, his product being handled by the largest department stores. Mr. Rouff says: "To produce first-class work in perfect stone finish requires more care than is generally given to such work by concrete products manufacturers in this country. Men

interested in the uses of concrete along this line, who have traveled in Europe, more particularly Germany, doubtless have been surprised to see the extensive use of the material, not only in cheaply constructed buildings but in the most fashionable streets in connection with the more elaborate structures. Much work of this kind has been done in Germany which cannot be detected from natural stone." In this connection, CONCRETE calls attention to the fact that the true criterion of success in this work is not that the products cannot be told from natural stone, but rather that they have a beauty and a character which belong solely to concrete. Mr. Rouff says further: "A leading German concrete products manufacturing company had a contract last year to replace some large sandstone figures 7' high on the royal castle. These figures were made in brown stone, but were chipped and weather worn and were in danger of



Molding Concrete with Template

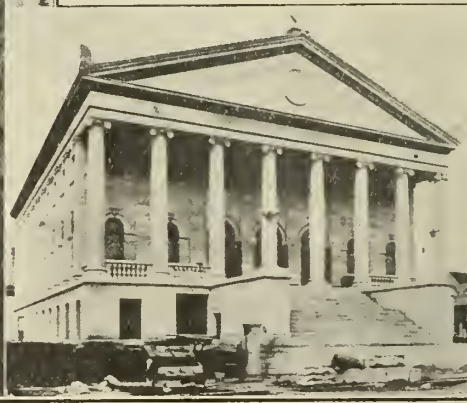


These three views show an effective use of concrete about the home—concrete plant urns and table are conspicuous.





Concrete Fence; Window Tracery and Arch Ribs of Concrete; Church Entirely of Concrete



falling apart. The fact that the architect who had this repair work in charge on the royal mansion specified concrete work to replace the original figures, indicates that the value of the material is perhaps better appreciated by architects abroad than by those in this country. Good concrete products can be made in this country just as well as abroad, and if they are made there is no doubt about the extent of their use. The architects will see the value of the material when they have been shown conclusively that attractive products can be made.

"To produce a first-class concrete product, I have used a fine aggregate consisting of crushed granite, crushed limestone and other stones crushed. It is important also that the cement be well seasoned; it should be four or five weeks old, at the least. After

the products are taken from the molds they should be covered with damp cloths and these cloths should be kept damp for at least ten days, or else the products should be put in water basins for forty-eight hours. Another thing which is frequently overlooked is that the work room be free from drafts. No concrete product of this kind should be put out in the weather until it is at least three or four weeks old. Much of the work, when thoroughly cured, is gone over with a weak solution of muriatic acid, which gives a fine texture. In Germany, it is a common practice for some products of this kind to be gone over by a stone cutter to give a natural stone finish."

The work of the National Stone Mfg. Co. is practically all done with a mixture of crushed St. Cloud

granite, washed sand and Portland cement, thoroughly mixed and poured very wet into sand molds. Great excess of water is used and the sand takes up some of this excess. The result, the company says, is a stone very fine in texture, more dense and more nearly non-absorbant than concrete made by the semi-dry process.



National Stone Plant Urn of Concrete

On page 30 illustrations are shown of concrete work in Minneapolis. The fence built for F. W. Clifford by the National Stone Manufacturing Co., after a design by Architect Harry W. Jones, has been previously referred to in CONCRETE. The interior view in the same group is of St. Marks' church. The exterior of this church is of buff Bedford stone and the window tracery is of concrete made to harmonize with the stone. The ribs in the arched ceiling also are of concrete. The building with the row of pillars is the First Methodist church and is built entirely of concrete stone. The illustration at the

top of page 29 shows work done in Philadelphia by the Ruoff Construction Co., of that city. The pergola pillars are made with a mixture of Medusa white Portland cement, white sand and some red and black stone screenings. The pillars are decorated with colored tiles set into the concrete. The yard in which this pergola was constructed is surrounded by a concrete wall, only a small part of which is to be seen at the extreme right of the picture. On the posts of the wall are concrete flower boxes. Some of these boxes are illustrated. The garden benches shown in the illustration with the pergola also are of concrete. The illustration in the center of page 29 shows a man molding a concrete vase on metal fabric, using a template. The large vase is in two sections and the pieces about to be joined are shown in an illustration at the bottom of the page,

together with two illustrations showing effective use of concrete in the garden, a concrete table being conspicuous in the center illustration. This work was done with Atlas white Portland cement.

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Ruoff Concrete Flower Box

Buils 116 Bridges and Culverts of Concrete

New Kansas City Interurban Electric Line Will Avoid Expensive Maintenance Items

The Kansas City, Clay County & St. Joseph Railway is an interurban electric line being constructed by the Wyandotte Construction Co. between Kansas City and St. Joseph, Mo., a distance of about 50 miles; and between Kansas City and Excelsior Springs, about 25 miles.

This road will open up an entirely new country to better transportation facilities, passing through the beautiful rolling hills of western Missouri. Because of the broken character of the ground over which the road passes, it has been necessary to build an unusually large number of bridges and culverts—116 in all.

As it is the idea of the railway company to build a line that will give the best service, to reduce the cost of future maintenance to a minimum, all culverts and bridges, with the exception of one over the Platte river, are being built of reinforced concrete.

All small openings up to an area of 12 square feet are made of reinforced concrete pipe manufactured by the Kansas City Concrete Pipe Co. shipped to the site, and placed by the grading contractors. These openings are to be furnished with reinforced concrete heads built after the road has reached such a stage of completion that work trains can bring the materials to the sites. The larger culverts and bridges are rein-

forced concrete arches, the smallest having a span of 4' and the largest consisting of three 60' spans. This work was designed by Daniel B. Lutten, consulting engineer, Indianapolis, Ind., with the approval of Robert



Bridge of Two 50' Spaces, Excelsior Springs Division

P. Woods, chief engineer, and is being carried on by the Topeka Bridge & Iron Co., Topeka, Kan.

The live load for which the bridges are designed consists of 100 ton cars in train at high speed. The unit stresses in the materials are as follows: Compression in concrete, 500 lbs. per sq. inch; tension in concrete, not reinforced, 0 lbs. per sq. inch; shear in concrete, 50 lbs. per sq. inch; compression in steel not

(Continued on page 71)

Concrete Wins in Sewer Pipe Fight

First Reinforced Concrete Pipe Was Laid in
Kansas City, Missouri, in Winter Just Passed

In the manufacture of sewer pipe and the construction of sewers, concrete is gaining more and more ground because of the indisputable fact that it is the most indestructible of all materials used for that purpose. Although Portland cement has been used in sewer construction for many years, the real development of the concrete sewer pipe and concrete tile industry has been in the last decade.

The industry is gaining favor despite aggressive competition from manufacturers of clay pipe. The fact that concrete tile is a substantial material is convincingly shown in the fact that it has withstood much criticism and has come into general use. This phase of the cement industry deserves the concerted attention of the manufacturers of cement as a means to the greater consumption of Portland cement that is bound to follow as the merits of concrete pipe and tile are better known. The united support of cement manufacturers would be strong enough to counteract the influence of clay pipe manufacturers and at least put concrete sewer pipe on an equal footing with glazed clay pipe.

Concrete pipe manufacture is a splendid business enterprise for those with a fighting spirit. The Kansas City (Mo.) Concrete Pipe Co. was organized in April, 1911, and after fully equipping a plant for the manufacture of all sizes of pipe, it began operations a few months later. The business has had an encouraging growth under the management of W. C. Mullins and B. M. Hopkins, who are both practical men. Mr. Mullins has been doing successful sewer construction in Kansas City for thirty years. Mr. Hopkins was formerly a contractor of Detroit, Mich., and made a specialty of the construction of concrete culverts and drainage lines. The company has made an aggressive fight to have its product specified and recognized by the officials of Kansas City. It made the fight almost single handed against the clay interests. One of the Kansas City newspapers recently insinuated that clay sewer pipe was favored for political reasons that have little to do with the merit of clay pipe.

The concrete pipe manufacturers knew they had merit on their side. As to the practicability of concrete pipe for sewers it has been proven that it has been used with better results than clay. In Brooklyn, N. Y., about 400 miles of concrete pipe has been laid, and it is noted in this connection that when a sewer was uncovered in 1906 while excavating for the subway, both concrete pipe sewers and vitrified pipe sewers of the best Scotch make were exposed and the concrete pipe sewers were found to be intact, and to show far better wearing value. This sewer had been constructed forty-five years before the investigation was made. In 1904 the efficiency of concrete sewers was forced upon the city's notice with the

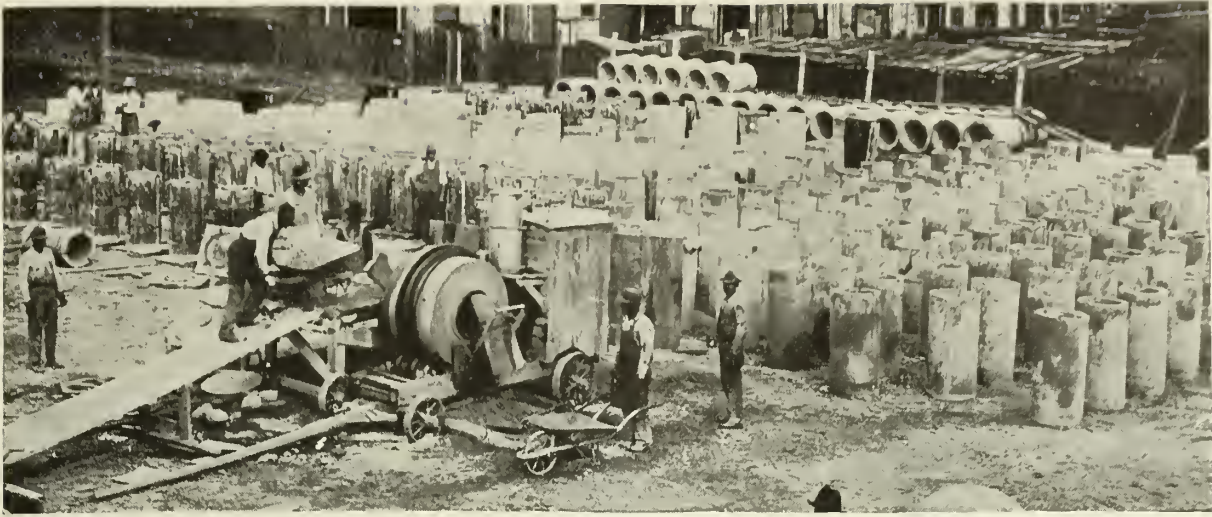
result that concrete pipe is now being laid in Brooklyn under standard specifications.

Duluth, Minn., is another American city which has had a profitable experience with concrete pipe sewers.



Laying First Reinforced Concrete Pipe in Kansas City, December 23, 1911

Its report shows that one section of 2,000' of 4" sewer shows no appreciable deterioration after being subjected to a tremendous water flow at the rate of 42 feet per second, and that sewers of concrete pipe which were laid 24 years ago show no disintegration



Yard of Concrete Pipe Factory

or cracking to this date. The city of Milwaukee has used concrete sewers for the last thirty years and now has 200 miles of concrete pipe sewers. The city engineer of that city made the statement in answer to a query on the subject that the concrete sewers were constructed at less cost and were lasting better than sewers which they had built of clay or brick. There is hardly a city anywhere that is not using concrete in some form in its sewer construction.

The fact that concrete pipe for sewer construction and drains has been subjected to such rigid tests and specifications has had the effect of establishing it more firmly in construction work. Kansas City, on account of the irregularity of its surface, has a large amount of storm and drainage sewer construction. For many years the only sewer pipe which was allowed under the city specifications was the clay sewer pipe. When concrete pipe was first urged upon the city, there was much doubt concerning its worth for sewer construction. But after a series of the most exacting tests, which embraced every phase of sewer construction, it

was admitted under the city specifications. That the city was so exacting and cautious before admitting concrete pipe and that after such severe testing it was approved for use in the city sewers, indicates that it thoroughly meets the requirements of such service. The pipe used for the Kansas City tests was made at the factory of the Kansas City Concrete Pipe Co., and it answered every requirement to be admitted upon an equal basis with clay pipe.

As already stated, the pipe company entered the field last year, and this organization was brought about by the demand for a concrete pipe to be used in lieu of clay pipe—since it is cheaper and more durable, and could be laid at greater saving to the city. But the Kansas City ordinances would not permit of its use—neither were there specifications for concrete pipe. This company presented its claims to the Kansas City Board of Public Works, but its pipe was refused admission or consideration. Then came the fight,

(Continued on page 73)



Making Concrete Pipe

New Type of Hollow Concrete Column

Kansas City Architects' Designs Executed
in Every Detail for Special Requirements

It is important in increasing the usefulness of concrete in various construction details, that architects be given a freer hand in the matter of design than is allowed them when they are limited in their use of concrete columns for instance, to columns

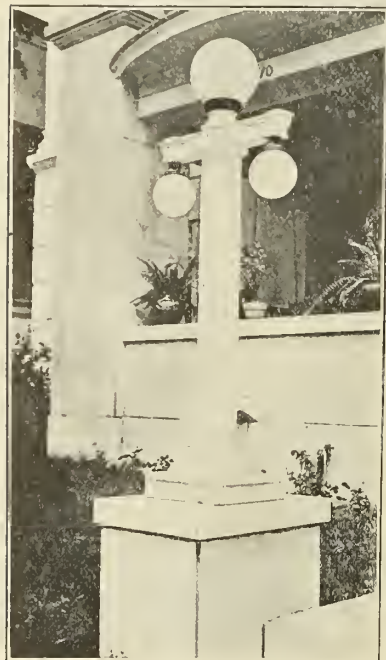


Fig. 4

Many architects in that city are now using Truss-wall columns* of concrete not merely because they can be made after special designs but because they are hollow and therefore light and may be handled without great expense.

Accompanying illustrations show the uses to which these columns have been put.

In the manufacture of these columns, it became necessary to manufacture true to detail, to make them perfectly round, and to have efficient reinforcement in order that the columns could be handled safely at minimum expense. It was necessary to eliminate mold marks and follow all specific details; for this reason the column is turned. The first operation is to set a collapsible core on which the column is constructed. The core is also used as a mandrel. As the core is revolved, a system of templates of both wood and metal is employed in developing any lines required by the details submitted. The mandrel is revolved between two adjustable standards, and the first coat of cement plaster is applied on the core. After this first coat has set so that the column may be handled, it is then wired by winding a wire spirally around the column from end to end until it is interwoven into a mesh. If the load on the column is extra heavy,

upright reinforcing rods are anchored in the mesh.

The lathes employed in the manufacture of the columns are adjustable to take the smallest as well as the largest pieces, and adjustment is made by one man in a few minutes.

After introducing the reinforcing, the final coat of concrete is applied and the templates give the

cast in molds of regular design. A multitude of molds are available from which to make a selection, but it frequently happens that the architect has some special idea to be executed in concrete and in making possible such freedom of design, interest attaches to a system of construction which has met increasing favor in Kansas City, Mo.



Figs. 1, 2 and 3

column its form. This method of applying the concrete makes it possible to trowel and float it down, thus insuring maximum density. The column is finished with any texture varying according to mix-

ture, and special trowels employed to finish the surface. The column is then removed from the lathe and allowed to cure.

The column when cured is so rigid that it has not been necessary to devise any special means of delivering it to the building.

Figs. 2, 3, 4 and 5 show these columns and Fig. 1 is introduced with the other illustrations because it is an attractive piece of work, said to be the first concrete fence of its kind in the vicinity of Kansas City, and not because it embodies a use of the Trusswall columns. The fence is on the estate of

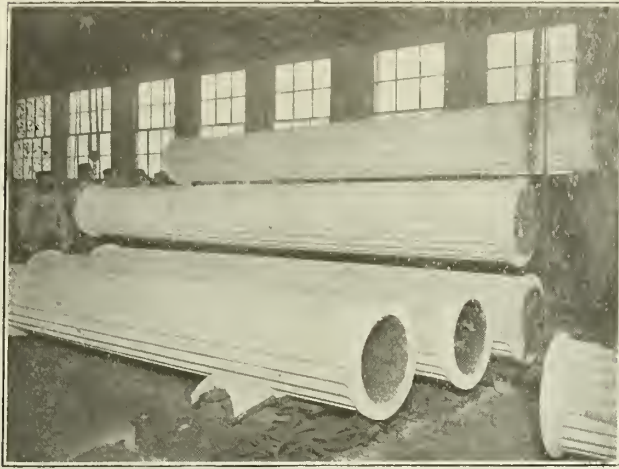


Fig. 5

Joseph D. Havens, Kansas City. All the columns shown are in Kansas City.

Fig. 2 illustrates a porch at the home of Webster Withers, designed by Architects Shepard, Farrar & Wiser, who have specified many of such columns. Fig. 3 shows the residence of Wallace Good, Root & Siemans, architects. In this case the concrete columns replaced others of wood. The capitals surmounting the columns also are of concrete. Fig. 4 illustrates a lamp post of concrete at an apartment house owned by Charles T. Murray. The post design is by Architect J. F. Lauck. Fig. 5 shows concrete columns of a large type in the factory.

Kansas City Convention Arrangements of the N. A. C. U.

The Eighth Annual Convention of the National Association of Cement Users will be held in the Hotel Baltimore, Kansas City, Mo., Monday, March 11, to Saturday, March 16. The various papers, discussions, committee meetings and business sessions have been arranged tentatively as follows:

MONDAY, MARCH 11.

10:30 a. m.—Meeting of the Executive Board, Hotel Baltimore. 2:00 p. m.—Meeting of Sectional Committees on: Building Blocks and Cement Products; Exhibition; Fireproofing; Insurance; Measuring Concrete; Nomenclature; Reinforced Concrete and Building Laws; Roadways, Sidewalks and Floors; Specifications and Methods of Tests for Concrete Materials; Treatment of Concrete Surfaces; Education. 8:00 p. m.—Formal opening of the convention, Hotel Baltimore; Address of Welcome to Kansas City; response by the president, Richard L. Humphrey, Philadelphia, Pa.; business session; address, "Reinforced Concrete Water Purification

Works, Dr. Walter M. Cross, city chemist, Kansas City, Mo.

TUESDAY, MARCH 12.

9:00 a. m.—Meeting of the sections on Measuring Concrete, Nomenclature, and Specifications and Methods of Tests for Concrete Materials; Topical discussion on Methods of Measuring Concrete Construction, and on Materials Used for Concrete. 10:30 a. m.—Report of the Committee on Measuring Concrete, Robert A. Cummings, chairman; Report of the Committee on Nomenclature, Peter Gillespie, chairman; Report of Committee on Specifications and Methods of Tests for Concrete Materials, Sanford E. Thompson, chairman; Discussion on Aggregates for Concrete, by Wm. M. Kinney, assistant inspecting engineer, Universal Portland Cement Co., Pittsburg, Pa.; Discussion on the Use of Calcium Chloride as a Preventive of the Freezing of Concrete, by Richard K. Meade, chief engineer, Tidewater Portland Cement Co., Baltimore, Md.; Report of the Committee on Fireproofing, Rudolph P. Miller, chairman. 8:00 p. m.—Annual address by the president, Richard L. Humphrey; "Construction of the Hollow Reinforced Concrete Dam of the Portland Railway Light and Power Co.," Robert S. Edwards, consulting engineer, Portland, Oregon; "Discussion of the Advantages and Comparative Cost of the Hollow Concrete Dam," W. L. Church, president, Ambursen Hydraulic Construction Co., Boston, Mass.; "The Design and Construction of the Keokuk Dam," Hugh L. Cooper, chief engineer, Mississippi River Power Co., Keokuk, Iowa; Report of the Committee on Insurance, W. H. Ham, chairman; Report of the Committee on Treatment of Concrete Surfaces, L. C. Wason, chairman.

WEDNESDAY, MARCH 13.

9:00 a. m.—Meeting of the Section on Reinforced Concrete and Building Laws; General discussion on Design, Methods of Construction, etc. 10:30 a. m.—Report of the Committee on Reinforced Concrete and Building Laws, A. E. Lindau, chairman; "The Design of Concrete Flat Slabs," F. J. Trelease, engineer, Corrugated Bar Co., Buffalo, N. Y.; Business Session, including report of the Executive Board and election of officers. 3:00 p. m.—"The Control Beam as a Field Test for Concrete," Fritz E. von Emperger, consulting engineer, Vienna, Austria; "Notes on the Deformation in the Webs of Rectangular Concrete Beams," H. C. Berry, assistant professor of Materials of Construction, University of Pennsylvania, Philadelphia, Pa.; "Continuous Concrete Beams," Dr. E. Probst, consulting engineer, professor, Royal Technical High School, Berlin; "The Construction of the Fireproof Type of School House With Separately Molded Members," Theodore H. Skinner, architect, Oneida Community, Ltd., Oneida, N. Y.; "Unit Cost of Reinforced Concrete for Industrial Buildings," F. W. Reynolds, Lockwood, Green & Co., Boston, Mass. 8:00 p. m.—"Methods of Construction Used in the Arbuckle Building, Brooklyn," R. C. Wilson, assistant engineer, Turner Construction Co., New York, N. Y.; "The Design and Construction of a Reinforced Concrete Dome, 220 Foot Span," Dr. S. J. Trauer, chief engineer, Breslau, Germany; "The Design of Reinforced Concrete Domes," H. Brussel, president, Reinforced Concrete Co., St. Louis, Mo.; "The Design of Concrete Grain Elevators," E. Lee Heidenreich, consulting engineer, Kansas City, Mo.; "The Construction of Concrete Grain Elevators," John S. Metcalf, consulting engineer, Chicago, Ill.; "Reinforced Concrete Grain Elevators and Silos," M. S. Ketchum, consulting engineer, Boulder, Col.; "The Use of Concrete in the Fourth Avenue Subway, Brooklyn," Frederick C. Noble, division engineer, Public Service Commission, Brooklyn, N. Y.

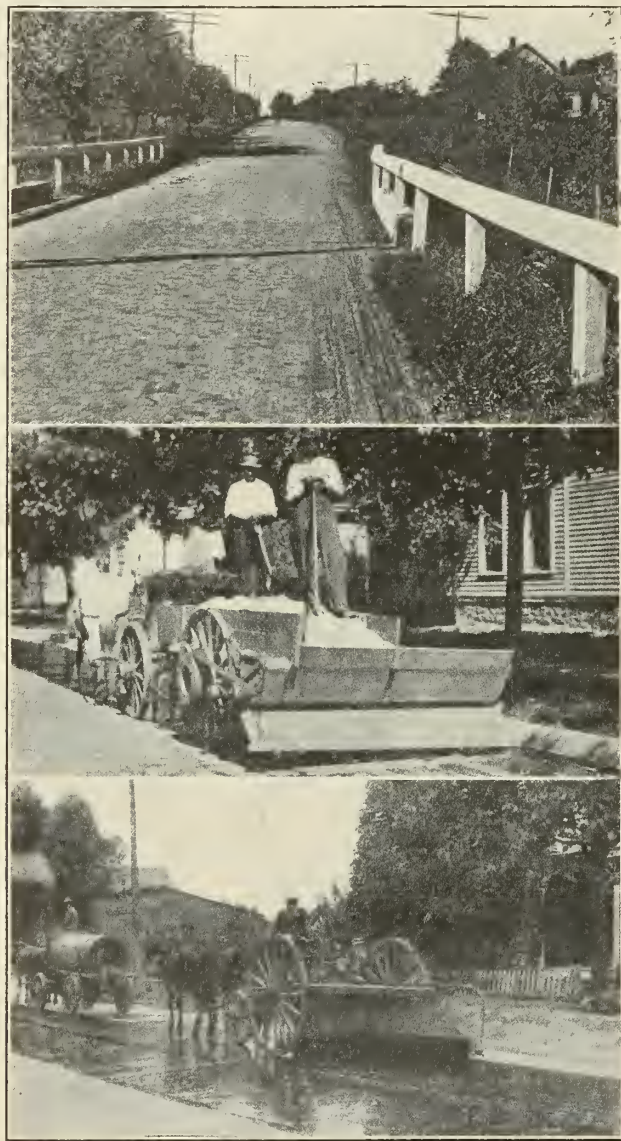
THURSDAY, MARCH 14.

9:00 a. m.—Meeting of Section on Treatment of Concrete Surfaces; Topical discussion on the Artistic Treatment of Concrete Surfaces. 10:30 a. m.—"Concrete Highway Bridges," Walter Scott Gearhart, state highway engineer, Extension Department, Agricultural College, Manhattan, Kans.; "The Dallas Oak Cliffe Viaduct," Ira G. Hedrick, consulting engineer, Kansas City, Mo.; "Flat Slab Bridges," W. H. Finley, assistant chief engineer, Chicago & Northwestern Railroad, Chicago, Ill.; "The Use of Cement for Protecting the Steel Pipes Along the New York Aqueduct," Alfred D. Flinn, department engineer, Board of Water Supply, New York, N. Y. 8:00 p. m.—"The Necessity for Good Roads," Logan Waller Page, director, Office of Public Roads, president American Good Roads Association, Washington, D. C.; "Cement Paving as Constructed at Mason City, Iowa," F. P. Wilson, city engineer, Mason City, Ia.; "An Improved Concrete Pavement," E. W. Groves, city engineer, Ann Arbor, Mich.; Report of Committee on Roadways, Sidewalks and

(Continued on page 73)

Two New Methods in Concrete Paving and a Concrete Guard Rail

Illustrations* on this page show two comparatively new types of concrete pavement. One roadway built near Greece, N. Y., is of 2" cubes laid on broken stone or gravel foundation. The cubes in the foreground are of vitrified clay, but most of the road is of



Pavement and Guard Rail, Greece, New York; Spreading Sand on Ann Arbor, Michigan, Pavement; Street Sweeper Spreading Tar Preparation on Concrete, Following the Sprinkler.

Portland cement concrete cubes laid with gravel obtained near the road. The road was built in 1909 and some of the same kind in 1910, and although requiring no repairs is still in excellent condition. It is reported that this is very much better than macadam and at moderate cost. A mile of this road built at Irondequoit, N. Y., cost \$6,000. The illustrations showing the Greece road also show a reinforced concrete yard-rail. The top is made in eight-foot sections 9" wide and 7" high, with a core 5" by 3" so that a wall 2" thick remains all around. About thirty inches apart

Various Methods Used in Winter Concrete Construction

The construction this winter of the four-story reinforced concrete machine shop of the Lamson Consolidated Store Service Co. at Lowell, Mass., by the Aberthaw Construction Co., Boston, has proceeded in spite of the cold weather, and there is every reason to believe that the work will be as satisfactory as though executed in summer inasmuch as the builder for the last eighteen years has carried through each winter with good results three or four concrete jobs. This building is 150'x50' in plan and has brick curtain walls. The architects are Lockwood, Green & Co., Boston.

The general policy of the Aberthaw company is to heat both the sand and the stone when it is to be used in concrete placed in freezing weather. However, on the Lamson job only the sand has been heated as the owners who are providing the heat have not sufficient



Building Enclosed in Canvas

steam capacity to heat the stone also. However, particular care has been taken to have the stone protected as far as possible from the cold. It is received in cars and when a car is on the siding precautions are taken to keep snow out of it by a canvas covering. The sand comes in on wagons, and is dumped directly onto steam pipes laid on the ground and furnished with a continuous supply of steam during the day time only at about 12 lbs. pressure. To supplement this the contractors used flexible rubber steam hose and iron pipes which are thrust into the sand heaps in specific places when there is reason to doubt the temperature of the sand. The steam supplied the contractors is used first in the engines, second for heating the building, and lastly comes to them at a very low pressure. This has made it quite difficult to get sufficient sand in proper usable condition at proper times.

The water is heated by having a steam pipe reaching to the bottom of the water barrel. The man in charge of the mixer turns the steam into the water until it is so hot as to be uncomfortable to the hand.

Salt is used generally in the proportion of about 2 per cent by weight of the amount of the cement used, the percentage being varied slightly as the temperature has changed. The method of applying the salt has been to make a saturated solution in a separate barrel of water, keeping this barrel warm and also agitating by the insertion of a steam pipe near the

*Courtesy Universal Portland Cement Co.

(Continued on page 74)

(Continued on page 74)

Some Concrete Work on Catskill Aqueduct

Difficult Problems Solved With Grout in Leaky Shafts—Concrete Covering for Steel

The construction work in carrying out the Catskill Aqueduct project is deservedly attracting widespread attention. It is inevitable that important problems have to be solved when it is proposed to bring an enormous supply of water from a mountain district one hundred miles distant, conducting it across a score of valleys some of them several miles in width, as well as across so deep and broad a river as the Hudson. The problems have especial interest for the municipal engineer because of the

very character of the enterprise. They have large interest for the concrete engineer for the reason that the construction of the aqueduct is everywhere involving the use of Portland cement and concrete. Concrete is not only involved in the cut-and-cover sections, but it is relied on to make possible a protective covering for the inside and the outside of the steel siphons. It was found of great value in sinking one of the deep working shafts; in fact, it may be questioned whether or not the sinking of



At the left above is a section of the steel pipe being covered with concrete. Some of the forms are still in place and some of the steel is still bare. At the right is shown a view of Hunter's Brook siphon. The concrete cradles are shown in foreground. Below is shown a stretch of the pipe and in the background the concrete mixing and rock-crushing plants.

this shaft would have failed without it. The aqueduct may be said, speaking broadly, to parallel the Hudson River, and will terminate in New York City. Consequently the route cuts across the tributary streams. These are creeks, or brooks of no especial importance, so far as size goes. However, they mark the positions of valleys, some of which are a number of miles in width. One of the largest is the valley of Rondout Creek. In making the crossing at this point, the aqueduct drops far below the surface of

the ground, far below the bottom of the creek and thus makes the $4\frac{1}{2}$ miles passage from one side to the other. A vertical shaft at either end, and a third located at an intermediate point will remain permanent features. In addition, five other shafts were sunk to the tunnel grade in order to facilitate construction. One of these, Construction Shaft No. 4, is 500' deep. It is 10' x 22' in horizontal section. Eighteen months were occupied in putting down this shaft. It was flooded six times. The strata passed were

Glacial drift.....	6 feet
Helderberg limestone....	226 feet
Binnewater sandstone....	39 feet
High Falls shale.....	92 feet
Shawangunk grit.....	134 feet

Total.....497 feet

The trouble with the water came, no doubt, almost altogether from the sandstone and the shale. But the water made its presence felt long before these strata were reached. The site of the shaft included the location where a 4" test hole had been put down. When a depth of about 80' had been reached, a sudden inrush occurred through this hole, filling the shaft half full. The emergency pumping plant had not yet been delivered; so that the contractors were caught unprepared. However, by the use of an air-lift and a couple of sinking pumps, the water level was lowered to a point near the bottom. A nipple was driven into the hole and casing attached to it. The purpose was to grout up the hole. In order to carry out this plan a 1" pipe was put down to the level of the Shawangunk grit—that is to the 363' level. The water was then permitted to return. Pressures were thus equalized and currents prevented. The grout was made 1:1 and poured down the 1" pipe. This latter was withdrawn as the grout filled in.

The problem of this one hole was solved in this way. But fears began to be entertained as to whether or not the ordinary methods of shaft sinking would prove success. It was understood that there was below a great deal of water under considerable pressure. With subsequent events in mind, it is not difficult to see that a special pumping chamber in the side of the shaft should have been provided before permitting the excavation to pass out of the limestone. This arrangement was made later, but the delay was the source of much trouble. However, excavation went on, and the sandstone was penetrated. At the 260-foot level, the amount of incoming water was only about 225 gallons per minute. However, during the drilling of the sump, an additional 600 gallons per minute came in suddenly through one of the drill holes, with the result that the shaft was flooded again. After some trouble, the shaft was unwatered, only to be flooded three additional times in as many weeks. Pretty much all of this water came in through bore holes, none of which was probably over 2" in diameter. When the fifth unwatering had been

completed, the conditions below were known to forbid further progress apart from special precautions. In fact, it had been ascertained that large crevices existed a short distance beneath the bottom of the excavation. One of the largest of these crevices was distant only a foot and a half. The size of the crevices ran up to 8". As compared with the 2" bore holes, they promised plenty of trouble

GROUTING UP CREVICES.

It was proposed to deal with the water question by means of grout. Four special machines were set up at the mouth of the shaft. A $2\frac{1}{2}$ " pipe led down the shaft to the bottom, where a 2" hose carried the grout to the point of use. At the beginning of operations, the grout gave trouble by leaking back. It would come in through the spaces around the pipes and through cracks in the bottom. This difficulty was successfully met by mixing finely ground horse manure with the grout. The manure produced a clogging effect. Some grout was wasted, but success was eventually obtained. In this procedure, a total of 2,900 bags of Portland cement was used. When the grout had hardened in the crevices, a few more holes were drilled. Water having a head of 65 pounds was found 14' below. These holes were soon grouted up, only 60 bags of cement being required.

But sinking was not at once resumed. It was deemed advisable to deal further with the question of the water. The grit was now about 100 feet further down. It was proposed to grout up the intervening water-bearing strata with more grout. Accordingly, six diamond drill holes were put down to the grit. Half were of the size corresponding to a 1" core; and half to a 2" core. With a pressure of 275 pounds per square inch, these holes were grouted up with 175 bags of cement. Nobody knew whether or not this small quantity of cement meant that the problem was a small one or had been only partially solved. It would seem that the thorough application of the method of grouting ahead of the excavation should have been employed sooner—that is, before the water-bearing strata had been penetrated. Sinking was begun again, and prosecuted until a depth of 320' was reached. A couple of collecting rings had been arranged, and many sinking pumps installed in the shaft. The work was much impeded. Besides it was difficult to secure easy, certain and adequate pumping capacity by the use of sinking pumps alone. It was determined to construct a pumping chamber off to one side at the 309' level. This chamber was 10' high and 17' x 24' in plan. Beneath its floor a sump 5' 6" deep and 16' x 22' in area was arranged. It had a capacity of 14,500 gallons. In the special chamber were installed three Cameron horizontal condensing pumps.* These were all of the 24" x 10" x 20" size and had a combined capacity of 1,050 gallons per minute. They were run by steam supplied by three 100 h.p. boilers set up at the

*Cameron Pump Works, New York City.

mouth of the shaft. Before the installation of this pumping plant, the sixth flooding of the shaft took place. Subsequently no especial difficulty was encountered from the water. More grouting was done, but none of the seams required more than 100 bags of cement, with one exception. When the grit was reached, a hole gave trouble and required 348 bags of cement. The amount of water pumped from this one shaft was 86, 181,000,000 foot-gallons. The total amount of Portland cement consumed in the grouting operations was 971 barrels.

STEEL SIPHONS.

Where the Catskill Aqueduct crosses a very broad valley, a permanent vertical shaft is put down on either side and the two bottoms connected by a more or less horizontal tunnel through the solid rock. But where the valleys are quite narrow, the practice is to make the crossings by means of steel tubes. These are of enormous dimensions. Three parallel tubes are required for each crossing in order to furnish full capacity. Only one is being put in at present—the middle one. There are to be in all fourteen steel siphon crossings of an average width of 0.455 miles.

Altogether the fourteen siphons will require for the single central tube something over six miles of steel pipe. The diameters are 9.50', 9.75', and 11.25'. The thicknesses of the steel plates vary from 0.438" to 0.750". The variations in diameter and thickness of plate are made in order to permit a standard capacity to be maintained under varying conditions and to enable varying bursting pressures to be withstood. The joints are riveted.

In crossing the Peekskill valley over a mile and a quarter of pipe is required. All of it is of the smallest diameter. A short length (139'), presumably at the lowest point, is of the thickest plate (0.750"); then there is a total of 1,000' or more of 0.688-inch thickness. The maximum head at Peekskill is 340'—45 per cent greater than in any other case. It is the widest and the deepest of the steel siphon crossings.

The steel pipe is furnished in 15' lengths. A circular joint has, accordingly, to be made every 15'. This fact has to be taken into account in the preparations for the reception of the giant tubes. Concrete cradles are arranged at such intervals as to permit the shop and field joints to come between them. The concrete cradles are 8' or more across—measured transversely with the line of the aqueduct; and about 3' wide. The same style is not used everywhere. A typical cradle has, however, a curved depression above to fit the pipe. It is then continued horizontally for a short distance. Underneath, a vertical section across the line of the aqueduct discloses a flat curve. The manner of casting is quite simple. Two bulkheads of the required form are placed on the earthen surface, which has been given the required curvature. The bulkheads are held temporarily in position by a couple of wooden strips nailed across. The concrete is poured in and the upper surface formed by hand. However, one transverse and several longi-

tudinal grooves are desired where cradle and pipe are to come into contact. These are provided by using short lengths of wooden strips. The object of these depressions will appear later.

When the cradles have been cast, the pipe suitably placed, and the field joints made, the entire siphon is filled with water, the pressure being brought to the conditions that are to exist when the aqueduct is in actual service. This is done not merely to test for possible leaks, but especially to give the pipe the exact form it will have when in actual use. While filled thus with water, the concrete envelope is put on. This is a proceeding requiring time. During this period, it is important that the pressure be maintained at the required degree. It is necessary, therefore, not merely to pump the pipe full, but to maintain the pressure night and day by means of pumps.

It is necessary or at least advisable to clean the surface of the pipe thoroughly preparatory to the application of the concrete envelope. It is possible that the concrete would absorb and take care of a thin coating of rust. But no chances are being taken on that. Removable ribs are employed to hold the lagging in place. At Bryn Mawr Park narrow wooden strips making lap joints with each other were used. The concrete is dumped upon the crest of the pipe. The jacket of concrete completely envelops the tube, except where the cradles themselves are located. Prior to placing the concrete of the envelope, a grout is poured into the grooves arranged on the upper surfaces of the cradles. Access is gained from the side. This grout fills the system of grooves beneath the steel plate and effects a close joint.

The placing of the interior shell of cement mortar is one of the most interesting and important matters connected with the steel siphon work. This lining is required to have a minimum thickness of 2 inches and a smooth internal surface when finished. A little consideration will show that we have here a considerable problem. Of course, any satisfactory solution of the problem must be a commercial one. Considerable experimenting has been done.

A steel form presents perhaps the best surface adapted to secure the desired smoothness. It would, perhaps, be difficult to provide ribs strong enough and yet sufficiently flexible to permit slight variations in form to be made. The tube is not a circle—it is, rather, an ellipse. A device for blowing the grout on to the steel and thus building up the required thickness was tried for a while. It seemed to put the mortar on satisfactorily, except that it left a rough surface expensive to smooth. On one contract, wooden forms are used. The bottom of the lining is put in by hand. The remainder—about 270 degrees—is placed at a single pouring when a section of form, perhaps 20 feet long, is ready. This consists of nine segments, each covering about 30 degrees. Each segment is a unit. They are all alike, so that no mistakes can occur in arrangement. Ribs giving strength to one segmental form inter-

(Continued on page 63)

Efforts Toward Surface Finishes on Early Concrete Bridges

BY HENRY GRATTAN TYRRELL.

My attention has recently been called to the efforts made by some of the early builders of concrete bridges to produce satisfactory surface finish on their works, and as the particular instances referred to here may not be familiar to all engineers, I have taken the trouble to write them down for others.

It is, of course, well known that the Romans made extensive use of concrete in the body of their piers and arches, the surface being faced with tufa and travertine, their constructive methods and the details of their anchors being plainly visible on the part of old Ponte Rotto which still remains. The same system of construction was extensively used on public works during the latter half of the eighteenth century and the first part of the nineteenth, but it was not until 1840 that a bridge was made almost wholly of concrete, at Grisoles, in France. It was the work of the eminent French engineer, M. LeBrun, who erected a span of 39' 4" over a branch canal of the Garonne. The only place where material other than concrete was used in this bridge, was in the exposed end of the arch ring which was faced with brick, and at the four vertical abutment edges below the springs which were faced with stone. All other exposed parts including the soffit and spandrels were of concrete. Ten years after the completion of this little bridge, the building of the Grand Maitre Aqueduct in France was begun, the construction of which continued for fifteen years. The long series of arches carrying the aqueduct was made wholly of concrete, the magnitude of the undertaking being hardly surpassed by any later works. The surface finish on this aqueduct, however, was not satisfactory, for when concrete arches were again used in France about 1855, on many fine bridges, some of which are masterpieces of constructive art, they were faced with stone in a method similar to that employed by the Romans. These bridges include Ponts au Diable, Austerlitz, Notre Dame, Napoleon, Invalides and Alma. Experimental treatment of arch faces was again tried in 1868 when a 75' concrete span was erected near Gloucester Road Station over the Metropolitan Extension Railway, London, the arch face being lined to represent ashlar. This attempt at imitating stone was not satisfactory, and has not since been greatly favored. It was found, however, that while bridges with concrete faces appeared to be aesthetic failures, they could be quickly built at small cost, and for several years following 1873 they were generally used in Ireland by Nathaniel Jackson, for spans of 18'-45', for highway crossings in the rural districts, and on private estates. It appears therefore that many of the methods recently used for producing satisfactory surface finish on concrete bridges, were tried by others more than forty years ago, before this type of construction came into any general use, and at least twenty years before the construction of the first concrete bridge in America.

Successful Convention of N. C. U. A.

In point of attendance and in interest of the papers presented, the seventh annual convention of the Nebraska Cement Users' Association was the Association's banner undertaking. Sessions were held in the convention hall of the Rome Hotel, Omaha, Neb., Wednesday, Thursday, and Friday morning, February 7, 8 and 9. H. C. McCord, Columbus, Neb., president of the organization, was the presiding officer and the convention was welcomed by President G. E. Haverstick of the Omaha Commercial Club. The following program was presented Wednesday morning: "Cement Drain Tile," Charles E. Sims, Worthington, Minn.; "Requisites of Good Concrete," L. E. Porter, York, Neb.; "Reinforced Concrete," Harry W. Mool, Omaha, Neb. Thursday morning, an illustrated talk on "Cement Silo Construction" was given by M. L. King, experimentalist in agricultural engineering, Ames, Ia.; "The Future of Cement Paving," by F. P. Wilson, City Engineer, Mason City, Ia.; and "Elements of Successful Manufacture of Concrete," by J. A. Everts, Omaha, Neb., made up the program.

"Reinforced Concrete Construction—Illustrated," by C. A. P. Turner, Minneapolis, Minn.; "Sand and Gravel Resources of Nebraska," Prof. George E. Comdra, Lincoln, Neb.; "What Grand Island is Doing to Boost Concrete," W. F. Roney, Grand Island, Neb.; and "The Future of Our Organization," I. E. Watenpugh, Western, Neb., were announced for the last day of the convention. Officers were elected as follows: Peter Palmer, Oakland, president; G. F. Lillie, North Bend, vice-president; Frank Whipperman, Omaha, secretary; and directors: Frank Berger, Hastings; H. R. Parks, Bruning; Milo Brown, Sutton; H. M. Kreiger, Rising City; J. C. Tracy, Loup City; J. N. Paterson, Omaha.

Mid-West Cement Exposition at Omaha

With thirty-four exhibitors actually represented on the floor, the exposition of the Nebraska Cement Users' Association at Omaha, Neb., was the largest and most successful ever held in the history of the organization. The severe weather and resulting imperfect railroad service prevented some exhibitors from getting to the show on time and some were unable to secure shipment in time to get their goods displayed.

The exposition opened Tuesday evening, February 6, and while the attendance was at no time so large as to crowd the hall most of those who came were in a buying mood, and a number of satisfactory orders were booked. The decorations were well handled and music was provided at the evening sessions. Every arrangement was made for the comfort of exhibitors and guests and it is expected that Omaha will be selected as the official site of the shows of the future. Secretary Peter Palmer and other officials of the organization expressed their satisfaction at the outcome of the show.

E. V. Parrish, who handles Omaha's publicity, was on hand to see that things were running smoothly and had little to do.

Beauty and Efficiency Combined in a Reinforced Concrete Cigar Factory

The recently completed right-triangular shaped reinforced concrete building of A. B. Smith & Co., cigar manufacturers, Cambridge, Mass., though a small structure is well worth consideration as it illustrates the possibilities obtainable by using concrete in restricted quarters, not only as regards factory advantages but also from the standpoint of architectural beauty. The building is owned by the Cambridge Factory Trust and was erected according to plans and specifications of Monks & Johnson, architects and engineers, 7 Water street, Bos-

ton. of the building are exceptionally well kept, the height seeming more than it really is, due to the continuation of the pilaster lines to the top. This is effected by means of corbels and small marble panels at the top. The entire width between the pilasters is taken up by the large window area beneath which is 4" brick veneering with concrete panels in the center and below each of the four respective windows. The entire cornice is of concrete while a concrete coping rests on the 8" thick brick wall running around the top of the building. The artistic effect is excellent. The building is a very creditable addition to the community and would not be recognized as a factory.

The interior arrangement of the building has been planned for maximum efficiency. All of the floors are of 7" concrete, the first floor having a terrazzo finish. There are three rows of columns on each floor running parallel to the long side of the building with 18' bays each way. The window area is about 75 per cent of the wall area, this being secured with windows 7' 6" high running up to the floor slab. The windows have wooden frames and sashes and are pivoted at the top, while the lower portions are double hung. The general width of the window is 15' 10". An automatic sprinkler system is installed throughout the building. The columns, rectangular in cross-section, vary from 20" x 30" in the basement and first floor to 16" x 30" on the second and third floor. The basement columns are reinforced by twelve 1" diameter rods with $\frac{1}{4}$ " hoops placed 12" on centers. The reinforcement of the first, second, and third floor columns consists of $\frac{3}{4}$ " rods, eight being in the first floor columns and



Cigar Factory of Concrete

ton. In the design mill construction and steel were not considered and it was simply a question of deciding between a flat slab system of construction and the beam and girder.

The engineers made estimates using both of these types of concrete construction and adopted the column and flat slab system, for it was found as cheap as the beam and girder type, besides offering the additional advantages of simpler forms, lower cost of automatic sprinkler installation, and better overhead shafting facilities. The forms for a beam and girder system would have been complicated owing to the triangular shape of the building.

This factory is three stories high with basement, with all floors and the frame of reinforced concrete, while the exterior between the pilasters is veneered with a 4" red facing brick. The longer side of the building is about 151' while the shorter sides are 87' and 132'. The lower floor is devoted to stores with entrance on Massachusetts avenue. The upper floors are devoted to cigar manufacturing, the entrance to these being by a stairway and an elevator in the right-angled corner of the building.

The general impression that reinforced concrete structures have a displeasing effect is being diminished by such structures as this factory. The lines



Interior View of Factory

this number decreasing by two for each successive floor. Hoops of $\frac{1}{4}$ " diameter rods are also used similarly to the basement columns.

The reinforcement of the floor slab consists of a layer of rectangular rods at the top and a layer of diagonal rods at the bottom, the latter having a

slight lap. The rectangular rods lap over column heads with laps ranging from 5' 4" to 8' 4". This method is slightly different from the ordinary and avoids four layers common in most flat slab systems. The floor load was calculated at 125 lbs. per sq. ft., and the mixture of concrete used at the column heads was quite rich, being 1:1½:2. It is stated that a saving in steel was made by this method.

The entire building which was designed with the intention of putting on another story later, rests on concrete footings placed on hard pan. These footings are generally 9' 6" x 8". The elevator well is of terra cotta while the chimney is of brick and at present there is a temporary roof of wood with plastic slate.

Although this building might properly be stated to be "absolutely fire proof" a serious loss might occur by the burning of the combustible contents. To prevent such an occurrence about 340 automatic sprinklers have been installed on a wet system put in in accordance with specifications of the General Fire Extinguisher Co., of Massachusetts. The interior view shows clearly the method of suspending the sprinkler pipes and the advantage gained in this connection from using a flat slab system.

The entire building was erected by the Concrete Engineering Co., Boston, in accordance with plans and specifications of Monks & Johnson, the architects and engineers.

Building Cement Plaster or Stucco Houses*

Suggestions as to Construction With Special Regard to the Ornamental Features

BY P. P. COMOLI†

In building a house, it is conservative to estimate that the contents will be worth at least as much as the house itself, and that there is upon the house the double duty of protecting not only itself, but also of sheltering that which it contains. Therefore, in the construction of the house, it is demanded that the materials and the methods shall be the best that human wisdom can devise, taking into account economy, durability, protection, appearance and general desirability. Of course, we contend that in the way of material the best is cement; and it is the object of this Association to exchange ideas as to what may be best in the way of methods of construction, and thus promote the more general use of concrete.

Economical advantages are always to be considered; and in this case it certainly is obvious that in ultimate cost the advantage is with concrete, on account of its durability, owing to freedom from decay, its certain protection to the contents of the building, its saving in the use of paint, its equalization of temperatures between summer and winter, and many other features. The original cost, of course, will vary according to the location of the property or the design of the structure; but it will be found that in many forms concrete may be used nearly as cheaply as perishable wood. Even if a house be constructed merely as an investment, a concrete building will be found to outclass any other, since it may retain its original value for centuries, while other forms of construction rapidly deteriorate, demanding constant expenditure for repairs.

There is lively interest among those studying modern building methods, in the controversy between the advocates of hollow wall construction and those who favor solid walls of reinforced concrete

for factories, warehouses and structures of like character. The writer is firmly of the belief that the hollow wall, constructed by tying two walls together with pieces of iron or heavy wire at regular intervals, while originally more expensive, is the best for all climates, as the air space thus formed acts as a barrier to excessive heat or extreme cold. Furthermore, it can be safely plastered on the inside without fear of frost or moisture penetrating—advantages which more than offset the slight additional cost.

The hollow wall is made in the same manner as the solid wall construction, except that the core is built in sections about two feet high, which rest upon the irons or wires used to tie the walls together. These irons should be long enough to extend half way through each wall, and the distance between them will be governed by the strength required of the structure. There should, however, be a course of these irons every time the core form is raised. The top and ends of each wall should be made solid the last three or four inches, thereby forming a dead air space, which must be continuous and not partial.

CEMENT PLASTER CONSTRUCTION.

If it be desired to have a house which can be cheaply built and yet have the external appearance of a solid cement structure I would recommend the following methods:

Use 2" x 6" studding for the outside walls, instead of 2" x 4", standing 16" center to center, bridged every four or five feet. First, cover the outside with ¾" sheathing boards not too close to each other, well nailed. Next put in two thicknesses of roofing paper, held by furring strips nailed at the studs. On this paper layer, staple expanded metal lath. Then the wall is ready for the cement plas-

*Abstract of Paper read before the Iowa Association of Cement Users, Sioux City, Ia.

†Sioux City, Ia.

ter. By this method you will be able to complete the interior, and do all the hammering and jarring necessary, and allow the wood to shrink and the house to settle before the outside is commenced, and thus eliminate the danger of cracking the concrete; and it also will do away with outside wood finish at the doors and windows, and permit the same treatment to be given at the final finish as on any other permanent construction. The cement plaster is an absolute protection for the metal lath, being moisture proof.

To the wood structure, apply the scratch coat about $\frac{1}{2}$ " thick and press it partly through the openings in the lath, roughing the surface with a shingle or a piece of metal lath. Allow this to set at least five hours, according to the weather, before the second coat is put on.

As a rule, two coats are used for a plain surface; but if a more artistic effect is desired, three coats are necessary. In making up the specifications for this class of work, the number of coats should be stated instead of the thickness, because Portland cement will stand only a limited quantity in any one coat, as is the case with paint. If it be put on too thick, it will either slide or crack when setting, according to the condition of the surface.

If Tyrolean rustic (or rough-cast) be desired as a final finish, it is necessary to treat the second coat accordingly with the proper tooling to indicate the margins at corners and openings, window sills, caps, water table, belt courses, panels and whatever trim may be desired. This, of course, must be done at least one day before the rough-cast is applied.

In rough-casting, start at an upper corner of the building by wetting the wall thoroughly. In the meantime, the helper mixes the plaster in the proportion of one and one-half parts of sand to one part of cement. This mixture should be taken to the place where it is to be used, and then wetted in a small box to the consistency of a very thick cream as needed, being kept well agitated.

This mixture must be put on with a broom made of fine twigs. Standing about 2' from the wall, the broom is dipped in the mortar and then struck on a round piece of wood held in the other hand. This allows the mortar to reach the wall in a spraying fashion, like raindrops. Repeat this by going backward and forward until the surface comes out in a rough form, or until it has come to the desired color. With this method it is possible to make three or four colors from the same mixture, wherever you intend to have them, in producing designs on the facade of a building, or on any other surface.

Cement plaster can be applied successfully to any walls or surfaces made of any material, provided special precautions are taken in preparing the surface properly, so the plaster will adhere and not crack or scale off. This work should be done by an experienced cement plasterer. Owing to the difference in the nature of stucco and lime plas-

ter, it is very important that men engaged in working with them should understand the chemical actions of the three different materials as used for exterior work in cold climates. Ignorance in these particulars is part of the reason why so much of such work has gone bad.

PREPARATION OF SURFACES.

If a brick wall has been laid up with lime mortar, it is necessary that the joints be raked out to the depth of half an inch, and so with any masonry laid up with any mortar except concrete. Then clean the surface thoroughly by using plenty of clean water so as to soak the wall.

As a rule, two coats are used—the first a scratch coat composed of two parts of clean sand to one part of cement, with about ten per cent of hydrated lime. The thickness of this coat should be about $\frac{3}{8}$ " to $\frac{1}{2}$ ", and it should be left rough.

Care must be exercised in applying the second or last coat, to see that the mortar in the previous



Concrete Wall, Showing Mr. Comoli's Method of Treatment

coat has reached the same degree of setting or suction over the particular wall area that is to be finished on that day, as this precaution is necessary for any kind of surface, to insure the desired uniform shade in the last coat.

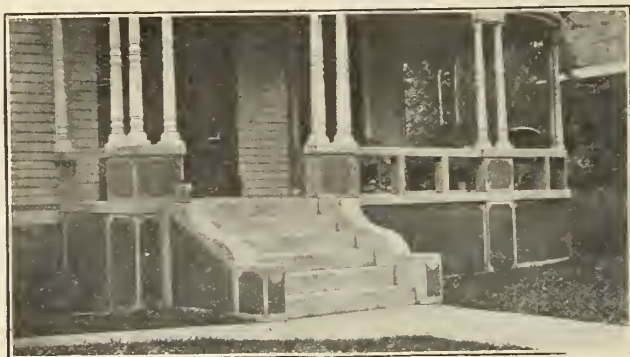
The prominence of reinforced concrete for residence and building construction has brought about a demand for decorative material with which to relieve the monotonous appearance of the unbroken gray color conspicuous in all concrete surfaces. While it is true that much work of a very plain character, in form as well as in surface, has been executed in concrete, yet all have an objectionable sameness of color.

For the exterior decoration of concrete, common brick, block, stone or wood structures, nothing can excel Portland cement plaster. In its adoption is found a medium yielding any scheme in color or design. It is impervious to climatic conditions, and as durable as the structure itself when it is done by practical workmen trained for the task.

A simple and inexpensive method of securing an artistic effect consists in covering the outer surface of the building with rough-cast of Portland cement mortar. When it comes to details, it is de-

sirable to have the trimming at the openings, water tables, belt courses and marginal corners to give expression to ideas of architectural beauty and workmanship. The concrete house conveys primarily the impression of strength, and it calls for the same qualities in all its various attributes, including the roof.

This humble material, so replete with possibilities, but as yet so little understood, is manifestly destined to take an important place in the ornamentation of our future buildings, and must therefore strongly influence their design. If our designers will devote themselves with sufficient energy to the demands of this new material, as it so well deserves, they will discover a new architecture



Porch Panels Are of Same Mix as the Lighter Borders; Done by Scraping Around the Panels

that will be full of life and character, strength and dignity, which will go to making up a living style.

It is to be regretted that the average cement user in the Middle West knows so little and cares less concerning its development. The time is not far distant when a cement worker must learn his trade, the same as is required in any other profession, in order to create a forced demand for his line of business in competition with the old orders of construction, and to create a better taste and to increase its appeal for more classical work.

The writer is of the opinion that the invention and use of machinery to turn out stereotyped units for alleged cement "construction," whether in the way of Edison's "poured houses" or in the way of supplying concrete blocks, have a retrogressive instead of a progressive tendency in the real art of using this splendidly plastic material. It seems that so long as the machine supplies the blocks which make them a living, a large proportion of cement users do not care to improve the conditions of their craft, and in too many cases the art of it lapses and withers.

In too many localities there are men, without previous experience in the business, who procure a few books on the subject and then go into "cement construction." Of course, technical or book knowledge is helpful, but practical experience is the great overwhelming necessity in order that the best results shall be secured.

My recommendation for the benefit of him who is inclined to take up this useful profession of ce-

ment construction, which as yet is only in its infancy in this country, is that he should perfect himself for the business through practical demonstration, assisted by such knowledge as he may acquire from books or from consultation with those who may have had experience. Already the hour has struck when winners in any occupation or profession must be experts in their line to accomplish the results the world demands.

What Mr. Comoli says about plaster or stucco construction is very well worth reading again. He has been engaged in distinctive work for a number of years, learning his trade abroad and developing it into an art in this country. The word "art" is used advisedly, for it is an art to make the decoration harmonize with the foundation. Like many other experts, Mr. Comoli is a trifle impatient of men less experienced than himself and we cannot entirely endorse his sweeping condemnation of concrete block as a finish material. Like everything else, the merit of concrete block depends upon their character and especially their relation to the general scheme of construction.

Mr. Comoli believes in simplicity, strength and fitness as the fundamentals of concrete embellishment. What work he has done or superintended is characterized by broad lines, surfaces intelligently broken into panels and a realization of the value of contrasts in light and shade. He advocates bringing the wall flush with the jambs of windows and doors, thus doing away with inconsistently small wood trim. He suggests that the cove is an excellent thing at the eaves. This is easily arranged by nailing suitably curved pieces of wood into the angle between wall and overhang, attaching metal fabric in a curve following the outline and plastering on the metal. Solidity is very largely a matter of design, and plaster houses can be built that have not only the required strength but the look of massiveness and unity that properly characterizes concrete construction.

It is particularly interesting to note that Mr. Comoli gets his effects of light and shade with the same mixture, governing the finished color by the amount of water applied to the plaster before it is deposited. If concrete is permitted to achieve a partial set and the surface is then lightly scraped with wood or metal, the scraped surface will bleach out lighter than the mass that is permitted to crystallize undisturbed. An example of what can be done in this way is shown in the two illustrations of steps and wall. The dark panels and the light trim are made of the same mix, but the edges have been scraped and the body has not. The art of handling shade contrasts is not to be learned from books, and is a matter for individual study and patient experiment. We heartily endorse what Mr. Comoli says concerning the advantage of apprenticeship and the necessity for an interest in and appreciation of the art of handling concrete surface.



General View of Viaduct Nearly Completed



Under Construction



Form Work, Mixing Plant and Tower

A Mile-Long Reinforced Concrete Viaduct

Structure of Fifty-One Arches Connecting
Dallas and Oak Cliff, Texas. Completed

BY F. M. CLUTTER.

The Dallas-Oak Cliff viaduct between Dallas and its suburb, Oak Cliff, Texas, is completed. Work was begun on this structure in October, 1910, and the contract called for completion December 1, 1911, but it was delayed and was not completed until the latter part of February last. It is planned at this writing to be thrown open to traffic the first week in March. It is the longest reinforced concrete structure in the world.

Dallas is a city of about 100,000 population, and Oak Cliff is a suburban town of about 10,000 population, separated from Dallas by the Trinity river valley. The Trinity river is a small stream ordinarily confined between steep banks not more than 200' apart, but at flood stages it rises as much as 50' and spreads out over the valley. At such times

traffic between Dallas and Oak Cliff is suspended for days at a time, causing great loss and inconvenience. It was accordingly decided to build a viaduct to do away with such interruption of traffic, and the county of Dallas voted a bond issue of \$600,000 with which to build the structure.

On November 19, 1909, J. F. Witt, County Engineer, advertised for competitive plans to be submitted on or before January 1, 1910. Designs were submitted by fifteen different engineers. The county court appointed an advisory board of engineers to pass on the plans, consisting of Prof. T. U. Taylor, M. Am. Soc. C. E., Prof. of Civil Engineering, University of Texas; Otto H. Lang, M. Am. Soc. C. E., and N. Werenskiold. The board recommended the adoption of the arch design submitted by Ira G. Hedrick, M. Am. Soc. C. E., consulting engineer,

Kansas City, Mo., and L. R. Ash, M. Am. Soc. C. E., associate engineer.

Mr. Hedrick's preliminary design was substantially the same as the final design, except that in the former all the piers but a few near the river were carried on reinforced concrete footings designed for a soil pressure of two tons per square foot.

The total cost of the structure, including engineering and all incidentals, is about \$570,000. The cost per square foot of floor is about \$2.10, which is a remarkably low figure for a structure of this type. The contract was awarded to Corrigan, Lee & Halpin, Kansas City, Mo. The concrete piles were put in by the Gulf Concrete Construction Co., Houston, Tex. The field work was carried on under the supervision of Hedrick & Cochrane, consulting engineers, Kansas City, Mo.

The viaduct is a structure of unusual magnitude. It is 4,778' long between the end abutments, and from end to end of approaches is more than a mile long. It has a roadway 44' wide between curbs and two sidewalks each 4' 6" wide in the clear, and is of reinforced concrete construction throughout.

The structure begins near the south line of Arlington street and proceeds along the east side of Houston street on an ascending grade of 2.8 per cent to a point near the tracks of the Missouri, Kansas & Texas Railway, the Dallas Terminal Railway, the Gulf, Colorado & Santa Fe Railway, and the Chicago, Rock Island & Gulf Railway, a distance of 567.7'. From this point the viaduct swings to the right through an angle of about 48 degrees, crosses the railway tracks overhead and runs on a level grade in a southwesterly direction to the south bank of the Trinity river, a distance of 2,529'. Thence it proceeds in the same direction on a descending grade to the west side of Lancaster avenue, a distance of 2009.4'.

The approaches consist of "U" abutments having wing walls of the ordinary buttress type retaining earth fill. Next to the north abutment is a 439' trestle construction, consisting of longitudinal girders resting on bents. Next to the south abutment there is 181' of similar construction. The main portion of the viaduct consists of fifty-one arches having a span 71' 6" between springing lines, or 79' 6" center to center of piers, and a rise of 17'.

The river span provides a transverse clearance of 90' between piers, and a vertical clearance above low water of 60'. The span over the river is of steel plate girder construction, and all the metal work is encased in concrete so that the span conforms in appearance to the remainder of the structure.

The horizontal thrust of the adjacent arch spans is transmitted through this span, and the adjacent arch ribs have distort sufficient to take care of the expansion and contraction of the steel span.

The live loads for the final design are the same as required in the case of the competitive plans. The electric railway loads were increased to allow for impact, 50 per cent for floor slabs and about 13 per

cent for arch ribs. No impact was allowed for the road roller concentrations of the uniformly distributed loads on roadways and sidewalks. The piers are designed for two conditions of loading: first, four 100,000-pound cars, 80-pounds per square foot on a width of 22' of roadway outside of the car tracks, and 50 pounds per square foot on sidewalks, all symmetrically disposed on the two adjacent spans so as to produce balanced horizontal thrusts; second, four 100,000-pound cars, 40 pounds per square foot on a width of 22' of railway, and 30 pounds per square foot on sidewalks, all on one of the two adjacent spans and producing an unbalanced horizontal thrust of 7,000 pounds per linear foot of width of arch ring. Under the latter condition which is considered quite unlikely to occur, it is computed that 2,000 pounds can, if necessary, be carried through the adjacent arch rib to the next pier, thus leaving an unbalanced live load thrust of 5,000 pounds per linear foot of width of arch rib to be taken care of by the pier, or 195,000 pounds altogether.

WORKING STRESSES.

Maximum compression on concrete in arches, excluding temperature stresses.....	500	lbs. "per Sq. In.
Maximum compression concrete in girders.....	600	" "
Maximum compression on concrete, including stresses due to 80 degrees variation in temperature	750	" "
No maximum tension in concrete will be allowed.		
Maximum shear on concrete, plain.....	30	" "
Maximum shear on concrete, reinforced for shear.	100	" "

When temperature stresses are included, the steel reinforcement takes the entire bending moment without being stressed in tension above its elastic limit.

CONCRETE PILES.

The specifications provided that concrete piles might be put in place by any method which would meet the approval of the engineer. The work was begun under certain conditions and tests, but had not proceeded far when it appeared from the tests made that the piling would not comply with the provision of specifications, and accordingly the Advisory Board recommended that the working load on the piles be reduced from 30 tons to 20 tons each, and that the bases be increased in size. The piers were then redesigned for the following working loads:

	Balanced live load condition.	Unbalanced live load condition.
Extreme load per pile, tons.....	20	20
Extreme soil pressure, tons per sq. ft.....	1.0	1.6

The soil as shown by the boring and excavations was hard, compact, black or yellow clay underlaid in places by sand and gravel. Accordingly in tests of the bearing capacity of the soil water was poured into the pits in some cases and allowed to stand. Several tests were made, giving fairly uniform results. The settlement under a load of six tons was only about 1/16", while under a load of ten tons it was about 7/4". It appears that under constant load the settlement continued for a few hours and then practically ceased. When the load was increased to 10 tons, water was added to the pit and was kept standing 3' deep. On the whole the settlement was proportional to the load. The maximum load applied was 20 tons per square foot, and after this load

was removed it appeared that the permanent settlement of the soil was $\frac{3}{8}$ ". This test was made with a $3\frac{1}{2}$ " x $3\frac{1}{2}$ " timber bearing on the soil. Other tests made with a 12" x 12" timber gave practically the same results.

The piles were made in place by pouring 1:2:4 concrete into holes prepared by driving a core into the ground and then withdrawing it. The average penetration was about 14'. The aggregate used for

tons each, so it was agreed to increase the size of the base so as to make good the deficiency in carrying capacity of the piles.

Every fifth pier is large enough to resist the dead load thrust of one adjacent span in case the arch on the other side of the pier should fail. Thus in case of the accidental failure of any portion of the structure not more than five spans would fail.



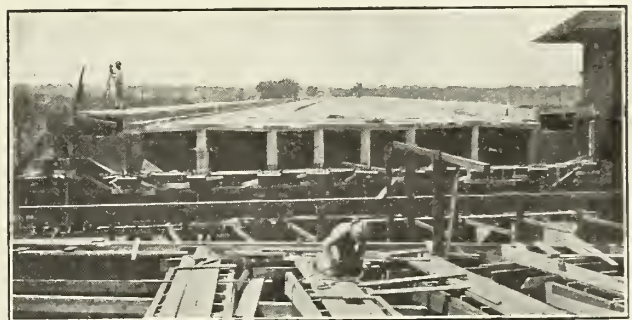
Stairway on Houston Street



Looking Toward Pier No. 1 from Arch No. 18



Houston Street Bents



Bent No. 9 and Panel No. 9, also Falsework of Panel No. 7

some of the test piles was gravel and for others Jacksboro stone. All concrete used was mixed wet and tamped as it was poured into the holes.

Some of the piles were exposed after being tested and it was found that several were cracked in one or more places, and in some instances the cross-sectional area of the pile had been reduced, owing to the pressure of the surrounding soil caused by driving adjacent piles. The sides of the piles were very smooth, and it was found impossible to tamp the concrete into the soil so as to increase the diameter of the piles.

It was decided that it would be safe to assume that the piles would carry an average load of 20

Both the ordinary piers and the so-called abutment piers are pierced by two openings 9' wide, at the top of which are semi-cylindrical surfaces. The distance from the springing line to the top of these openings is 4', and reinforcing bars are placed just above the openings. The three pier shafts are each 7' wide, and are reinforced. The batter of the ordinary pier is one-half inch to one foot and that of the abutment pier is 3" to 1'.

The abutment pier at the Dallas end of the arch spans is carried down to bed rock, the lower portion being of cellular construction. The abutment pier at the Oak Cliff end of the arch spans is founded on piles. The two piers on either side of the

river are of especial interest because they must carry the horizontal thrust of the arch spans in bending! The tension side of each pier is reinforced with 104 corrugated bars $1\frac{1}{8}$ " in diameter. These piers, unlike all others, are founded on timber piles, with 168 piles in each base.

The roadway of the approach is carried by reinforced slabs integral with the longitudinal girders, which are spaced about 5' apart. The girders act as "T" beams. The span lengths vary from about 24' to 50'. The ends of the girders rest on cross girders 2' 6" in width. On one side of the cross girder the longitudinal girders are rigidly connected to it by means of two bent copper plates of the full width of the girder, the lower resting on the cross girder and the upper being fastened to the longitudinal girder. The longitudinal girders on either side are connected by means of reinforcing bars just above the socket, but a cleavage plane is left between them, extending through the floor slab, so that the girder which rests in the socket is more or less free to rotate. The girders are thus discontinuous and are designed as simple beams. At suitable intervals expansion joints are introduced. At these joints the lower copper plate is replaced by two cast iron plates, the lower being embedded in the cross girder and the upper sliding on it.

In general, the cross girders are carried on three columns, and are designed as beams continuous over three supports. They are heavily reinforced against shear. The columns rest on reinforced spread footings of the ordinary type.

ARCH SPANS.

The floor is carried on eight crosswalls 8' 10" apart. These crosswalls rest on the arch ribs, which are of the barrel type and are 30' wide. The crosswalls have two openings, thus making them virtually a bent having the cross girder resting on three wide columns and cantilevered outward on either side to support the sidewalks and a small portion of the roadway slab. Over each pier there is a heavier wall having a "T" shaped section at either end of the pier, the head of the "T" being 4' wide and 1' 6" thick.

The floor slab is 10" thick under the electric railway tracks and 7" thick between the tracks and the curbs. The sidewalk slab is $3\frac{1}{2}$ " thick and spans from the curb to the fascia girder under the hand rail. There is a conduit space provided under each sidewalk slab. The roadway slab has a longitudinal recess or depression deep enough to permit the laying of tracks at some future time. This depression is drained by means of a 3" tile train, and the slab is waterproofed.

The arch ribs are 1' 4" thick at the crown and 3' thick at the springing lines. The nominal span and rises are 71' 6" and 17' respectively. The radius of the intrados is 46.09' and that of the extrados is 52.75'. The arch rib is reinforced with 35 lines of $1\frac{1}{8}$ " round corrugated rods in both intrados and extrados. The splices are arranged to stagger, and the rods extend 4' into the tops of the piers. The

How to Build Concrete Cisterns Above or Under Ground *

From the viewpoint of the intelligent housekeeper, there are few things more important than an abundant supply of soft water. The perfect reservoir is the underground cistern of concrete. The first underground cisterns were always prone to leak. In wet weather the ground water seeped in and transformed the soft water into water as hard as that from the well. In dry weather such cisterns were empty. By means of concrete property owners are now able to build their own cisterns that are jointless, watertight and large enough to store an abundance of soft water even in the driest season.

Concrete cisterns usually consist of two general types—underground and surface cisterns. The choice is dependent upon the amount of space available in the yard.

Underground cisterns may be built in any shape desired. For the same amount of concrete, round cisterns (with a depth equal to the diameter) will hold the most water. However, since round forms are not easy to frame, most cisterns are made square. To illustrate the usual method of building, consider the construction of a cistern 8' x 8' x 8' in the clear, with walls 8" thick and with a capacity of 121 barrels. Before beginning the work, have all the materials on hand, slightly more than required.

Locate the cistern in the most convenient place. Since the walls are 8" thick, lay out the hole 9' 4" square. The concrete bottom is 6" thick. Therefore dig the pit to the depth of 8' 6". Since the concrete cover or platform will be 5" thick, the top of the cistern will be 5" above the ground, which is a desirable feature.

If the earth walls stand firm, only an inside form will be needed; otherwise make a similar form for the outside of the walls. This form should be built (each side separately) previous to digging the pit, so that it may be quickly erected and the cistern finished before a possible shower makes the hole muddy. For siding, use 1" boards on 2" x 4" uprights spaced 2'. As soon as the hole is dug, set up the forms on 6" cubes or bricks of concrete, with 1" removable wedges between the forms and the bricks. The side wall forms will later support the platform on which the concrete cover will be built; and unless these wedges are used, the forms will bind and be difficult to remove. Join the forms at the corners so that they can be easily taken down after the cistern is finished. Against the earthen walls, and braced to the inside forms, set 1" boards, 12" wide, so as to prevent dirt from crumbling and falling into the cistern.

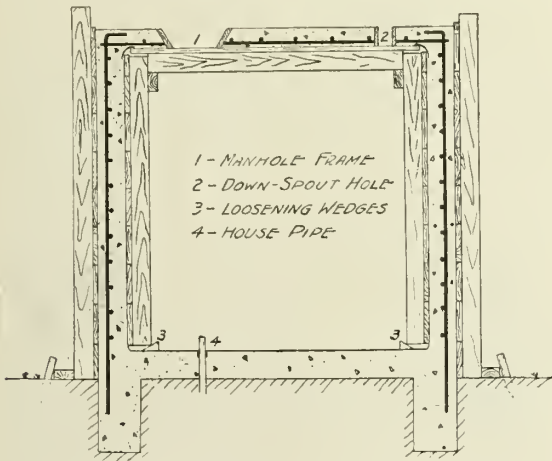
Mix the concrete 1 part Portland cement to 2 parts sand to 4 parts crushed rock. In measuring the quantities, consider 1 bag of cement equal to 1 cubic foot. If gravel is to be used, proportion the concrete 1 part cement to 4 parts clean gravel. For

*From Bulletins of American Association of Portland Cement Manufacturers.

the floor have the concrete just wet enough to flush a little cement mortar to the surface when tamped into place. See that there is an abundance of mortar around the concrete blocks supporting the forms. Immediately begin filling the sidewall forms with concrete mixed mushy wet and placed in 8" to 10" layers around the entire cistern. Be careful to shovel the concrete against the earthen sides as dirt in concrete is liable to make a leaky wall. Do not stop until the forms are filled. At the proper points, insert an overflow opening (if desired) and a sewer pipe connection for the water from the downspout or the filter and the pipe connection for the pump in the house. This pipe should be carried 3' to 4' under ground, out of danger of freezing.

REINFORCED CONCRETE COVER.

To keep out mice, vermin, scrub-water or filth, every cistern should be covered with a concrete platform reinforced with steel rods. After the con-



Cross-section of Above-ground Cistern, Showing Forms and Reinforcing

crete walls have been brought to ground level, set a wooden frame around the outside of the cistern so as to hold the concrete for the 5" platform. To run water off the finished cistern cover, slope this frame 1" in the direction desired. Five inches below the finished top of the cistern cover construct a strong wooden platform of 1" boards for flooring. Build this on 2" x 4" joists nailed to the uprights of the side forms. This wooden platform will support the concrete cover until it is self-sustaining. To provide for a manhole opening take 1" boards 6" wide and build a bottomless box 5" deep, 2' square at the top and 18" square at the bottom—outside measurements. Another plan is to have the tinsmith make a round bottomless tin form 5" deep, 2' in diameter at the top and 18" at the bottom, after the pattern of a large dish pan without a bottom. Grease the manhole frame and set it on the platform where the opening to the cistern is desired. An iron manhole frame and cover can also be used. By a similar use of a section of a gas pipe or small drain tile, leave an opening for the pump stock, if an out-door pump is to be used. Around this opening in the soft concrete place bolts (washer) for the pump. To locate the bolts correctly, set them by means of a

wooden block in which holes have been bored spaced exactly like those in the iron pump base.

Over the entire platform, spread 1" of concrete. For reinforcing quickly place on this concrete 10' lengths of $\frac{3}{8}$ " iron rods running in both directions (criss-cross) and spaced 1 foot apart. Bend the ends to a hook shape. Strengthen the platform around the manhole opening by placing two rods on each side. Bring the cover to its full thickness by immediately tamping in the remaining 4" of concrete. Finish the surface with a wooden float (a trowel) the same as for sidewalks. If the tin form is used, the manhole cover may be cast at the same time as the remainder of the floor. Reinforce the cover with short lengths of iron rods laid criss-cross. As a lifting ring for the cover, use half of an old bridle bit or a hitching post ring, the end provided with a knob of twisted wire or with a nut and large washer for holding it firmly in the concrete. If the wooden manhole form is used, carefully remove it after 5 hours. After three days build the manhole cover the same as for the tin form, with this exception—place greased paper or card-board around the edge of the opening to prevent the new concrete from sticking to that of the platform. To make the manhole cover lighter in weight, before placing the concrete, spread $1\frac{1}{2}$ " of wet sand over the wooden platform in the manhole opening and then tamp in the concrete. Take care to place the reinforcing within 1" of the bottom of the manhole cover. When the cistern platform is two weeks old, remove the manhole cover and saw an opening in the wooden floor. Descend, knock out the 1" wedges under the sidewall forms, take the forms apart and pass them out through the manhole opening.

HOW TO BUILD FILTER.

It is generally advisable to filter rain water. For this purpose provide a filter on the outside of the cistern proper. Construct this filter in the same way as the cistern was built except that the reinforced concrete cover should be loose so that it can be removed. Therefore, mold it on a smooth surface such as a wooden floor, and later put it in place. Make the concrete walls and bottom 6" and the cover 4" thick. Under most conditions a filter 2' square and 3' deep in the clear is large enough. Carry the walls a few inches above the surrounding ground. At the filter floor level connect the filter with the cistern by means of a 6" to 8" sewer pipe or drain tile laid with carefully cemented mortar joints. Likewise, 1' from the top, lay a similar connection for the pipe leading to the down-spout. Instead of using a square inside form for the filter, a barrel may be used. In the filter place a galvanized screen of $\frac{1}{4}$ " mesh over the pipe opening to the cistern. Fill in 18" of coarse charcoal. Cover the charcoal with 6" of sand and gravel. Place the slab cover on the filter, and the cistern is ready for use.

Below is given the amount of materials required for the cistern and the filter. Since the prices given are

liberal, by getting quotations from local dealers, the cost of the cistern may be found to be less.

The cost estimate is as follows:

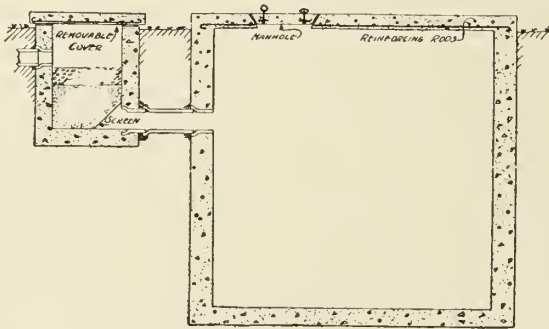
Crushed rock, 11 cubic yards.....	at \$1.10	\$12.10
Sand, 5½ cubic yards.....	at 1.00	5.50
Portland cement, 18 barrels.....	at 2.50	45.00
Reinforcement (18¾" x 10' rods), 93 lbs.	at .02¼	2.10

Total.....\$64.70

No estimate of the labor is given as the suburban or country dweller can easily build his own cistern with ordinary farm labor.

CISTERN ON TOP OF GROUND.

With the general use of concrete there has developed a new style of cistern which further lightens the work of the housewife. This new concrete cistern is built on top of the ground and, by direct pressure, forces the water through pipes into the house and does away with the work and exposure of pumping and carrying water. The piping of the



Cross Section of Underground Concrete Cistern and Filter

water allows the cistern to be located to the best advantage. Since the roof water from out buildings is free from soot and other impurities, many persons prefer to build the cistern at the barn, granary, or corn crib. The cistern shown in the illustration is placed on a 3' terrace in the rear of the house. The carrying of water is thus reduced to the mere matter of turning a faucet in the kitchen.

To illustrate the general method of construction, consider a cistern 8' x 8' square in the clear and 8' high with 6" side walls and floor and 4" roof. Such a cistern holds 121 barrels of water.

Make the forms or molds of 1" siding on 2" x 4" studding spaced 2' c-c. Remember that the siding always goes next to the concrete. Since the floor is 6" and the roof 4" thick, have the studs for the outside form not less than 8' 10" in length. The uprights for the inside form must be exactly 8' long. As the pressure of the concrete will tend to hold the siding in place, tack it lightly to the studding. Board up the outside form only to height of 3', so as to make easier the handling of the concrete and the placing of the reinforcing rods. Build each side separately in order that the entire form may be quickly erected. See that the forms are joined in such a way as to make their removal an easy matter when surrounded by the solid concrete.

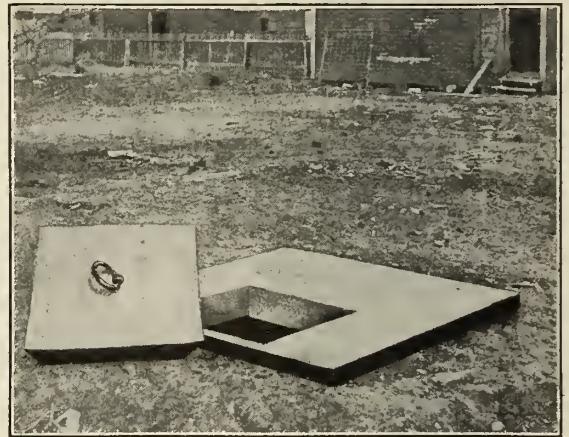
From the site of the cistern strip off the sod and other foreign matter. Do not disturb the solid

ground. Three to four feet below ground level (depending upon the depth of freezing), lay a 2" house-supply pipe and have the cistern end fitted with a pipe connection, set at the concrete floor level and 1' from the cistern wall. Carefully embed the pipe



Pump on Concrete Cistern Platform

in concrete to the first joint beyond the cistern wall. Thoroughly tamp back the earth removed, so that there can be no settlement underneath the cistern floor. Lay out the cistern 9' x 9', out to out. Within



Cistern Platform with Manhole Cover

these lines dig the foundation trenches 1' wide and 3' feet deep.

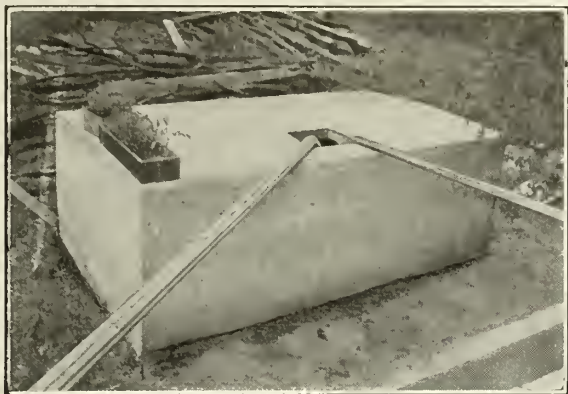
With the forms ready and the foundation trenches dug, begin mixing the concrete. Proportion the concrete 1 part Portland cement to 2 parts sand to 4 parts crushed rock. Four parts of clean bank-run gravel may be used instead of the sand and stone. In measuring the materials do not guess or count shovelfuls. Measure exactly by means of a bottomless box, and count one bag of cement equal to 1 cubic foot. Mix the concrete mushy wet and fill the trenches to a level with the under side of the cistern floor.

To take care of the water pressure, reinforcing rods must be run in both directions through the concrete wall. For this purpose, use ¾" rods 10' long. While the concrete in the foundation walls

is still soft, set the vertical rods in it, spaced 8" c-c, to the depth of 1'. Carefully place these rods so as to bring them within 1" of the outside of the cistern walls.

Next in order is the concrete floor. Make it 6" thick and tamp the concrete well. See that it overlaps the inside of the foundation wall and that the top of the pipe connection is at the floor level. Finish the surface with a steel trowel.

After the floor has hardened for three or four hours, erect the inside form. To aid in taking down these forms, place removable wedges between the ends of the studs and the floor. Before setting up the outside form, fasten the first four horizontal rods to the vertical reinforcing by means of small



Farm Cistern on a Three-foot Terrace

wire. These rods are spaced 8" apart. The ends must be bent and spliced around the corners of the cistern. Set the outside form and begin building the concrete side walls. Use the concrete mushy wet and work it down next to the wall form with a wooden paddle. Place it in 8" layers carried around the entire cistern. See that exactly 1" of concrete is between the steel reinforcing and the outside form. As the work progresses, add the necessary boards of the outside form and the lengthwise reinforcing rods. Do not stop placing concrete until the walls are finished.

THE CONCRETE ROOF.

While the 4" concrete roof is hardening, a temporary wooden platform is needed to support it. Build this platform of 1" boards nailed lightly to 2" x 4" joists. Let these joists rest on 2" x 4" stringers nailed to the studding of the inside form at a distance of 4" below their tops, so that when the stringers are loosened the platform will come down. To keep the mushy concrete from wasting, place heavy paper or thin cloth at the edges of the platform. For providing a manhole opening, take 1" boards 5" wide and build a bottomless frame 4" deep, 2' square at the top and 18" square at the bottom—outside measurements; or have the tin-smith make a round bottomless dish-pan of the same dimensions at the top and the bottom. Grease the man-hole frame and set it on the platform where the opening is desired. For the down-spout from the roof, make an opening by similar use of a round

(Continued on page 64)

Plans for Concrete Brick and Ship Lap House With Asbestos Roof

An individual type of house—one that has a character of its own—is always more desired than the ordinary stereotyped building which looks exactly like thousands of others.

We are illustrating, this month, a craftsman design with concrete brick for the first story, ship-lap siding for the second, and an asbestos shingle roof. The foundation walls to grade are built of concrete. Above

grade, to the bottom of the concrete water table, they are veneered on the outside with concrete brick, which is backed up with concrete.

This house is 27' wide and 36 6" deep, and is suitable for a 33' lot. The porch is 10' wide, and all of the exposed construction such as coping, steps, etc., is made of concrete, natural color.

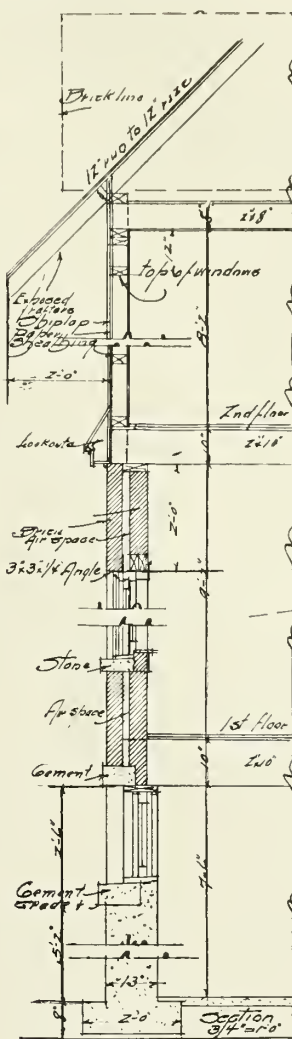
There are four good rooms on the first floor, besides the vestibule, stair hall and lavatory. The living room is 13' 6" wide by 20' 6" long, and is separated from the parlor, the stair hall and the dining room by sliding doors. The parlor, which could be used as a bedroom if desired, is 11' x 12' 6" and the dining room 13' 6" x 13'. There is a nice group of windows in the side of the dining room, which will make this room well lighted and pleasing. The living

room and the parlor have good broad windows facing the porch and at the sides.

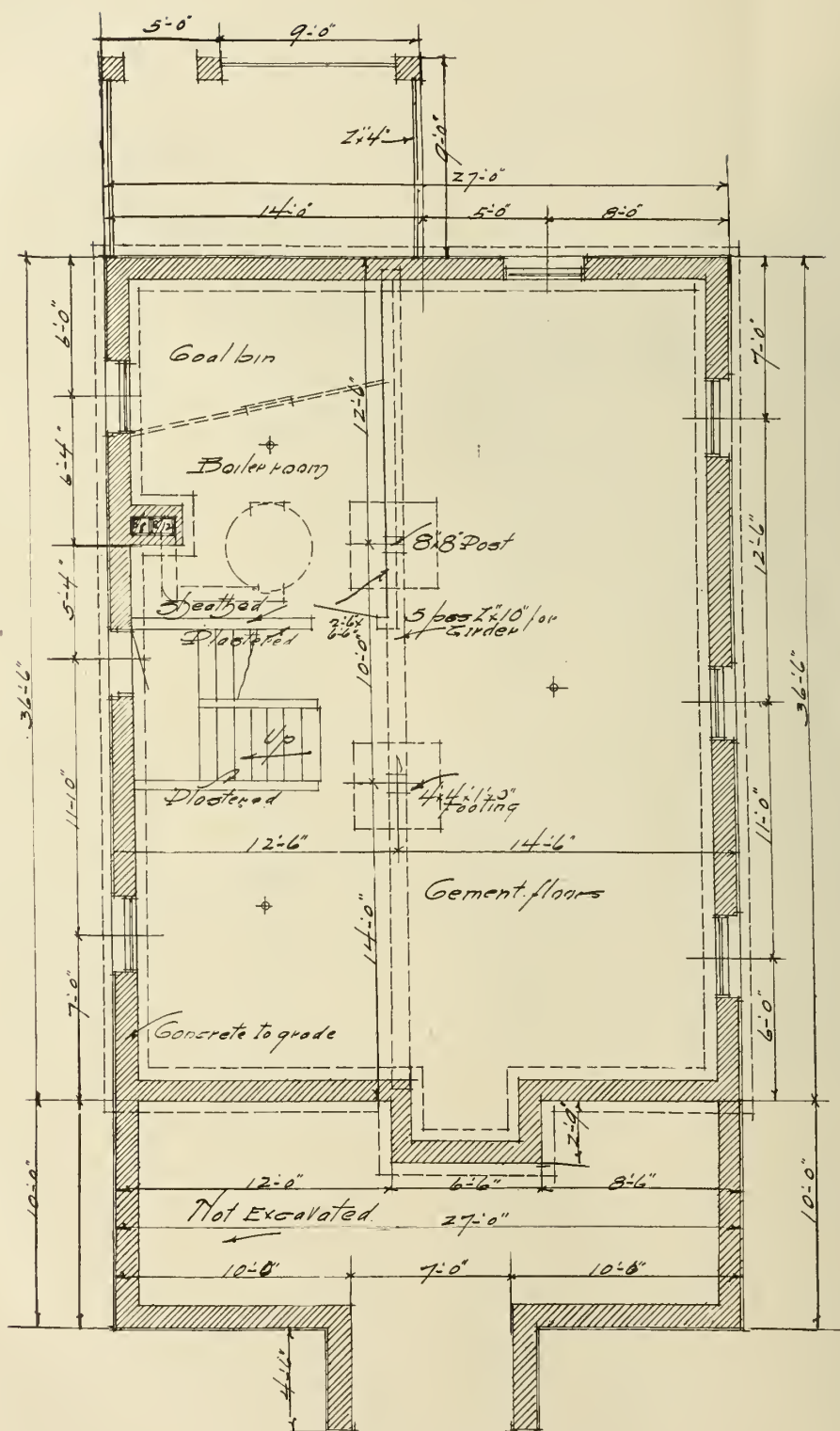
On the second floor are four square bedrooms, each with a closet. The bathroom and the linen closet are reached from a convenient and well lighted hall, from which there is also a stairway to the attic in which two bedrooms or a large playroom could be provided.

The trim in living room and in the vestibule is oak, and the balance of the first floor is trimmed in Georgia pine, stained, with birch doors and beech floors. The entire second floor trim is pine for enamel paint, with

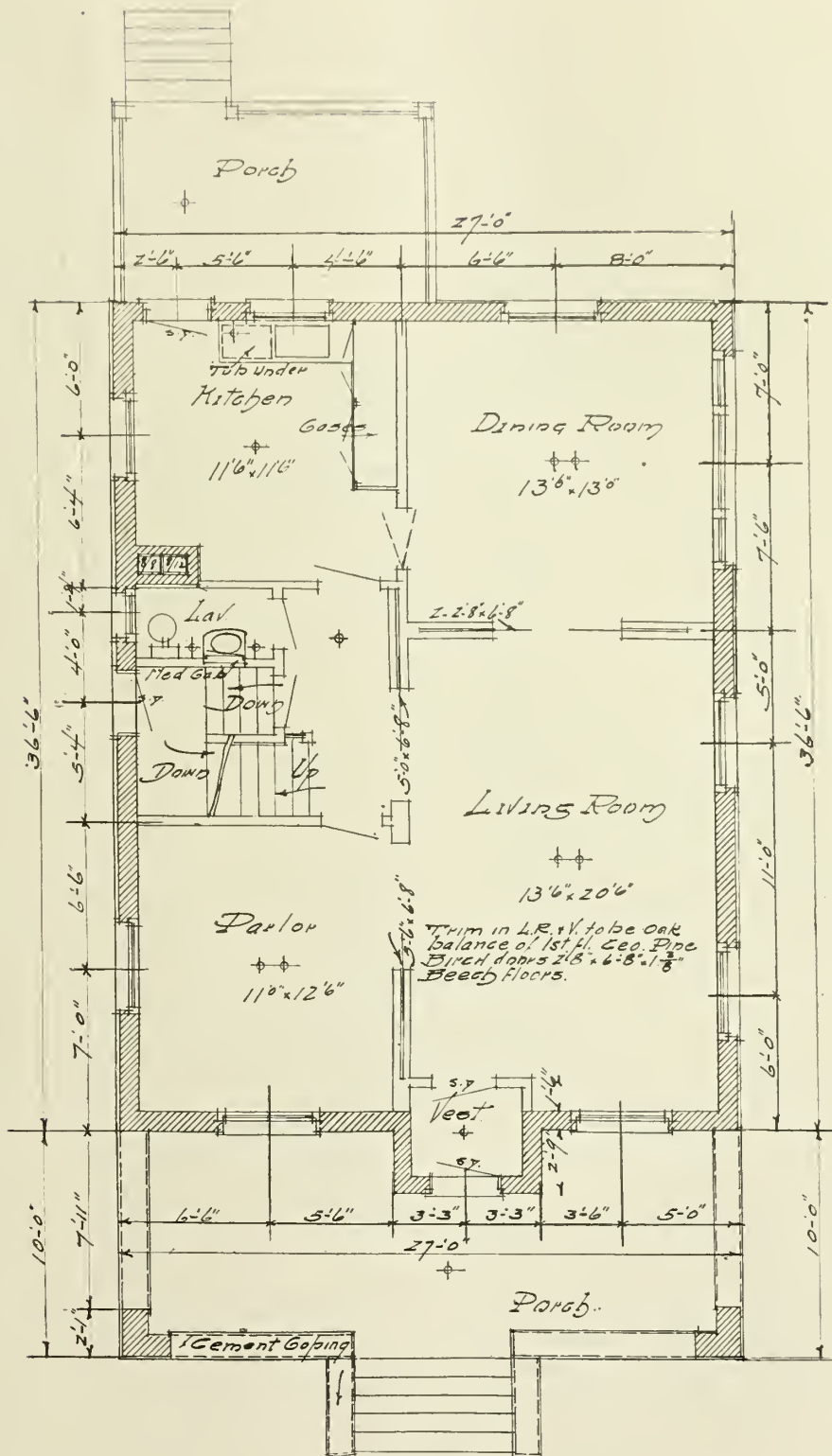
(Continued on page 57)



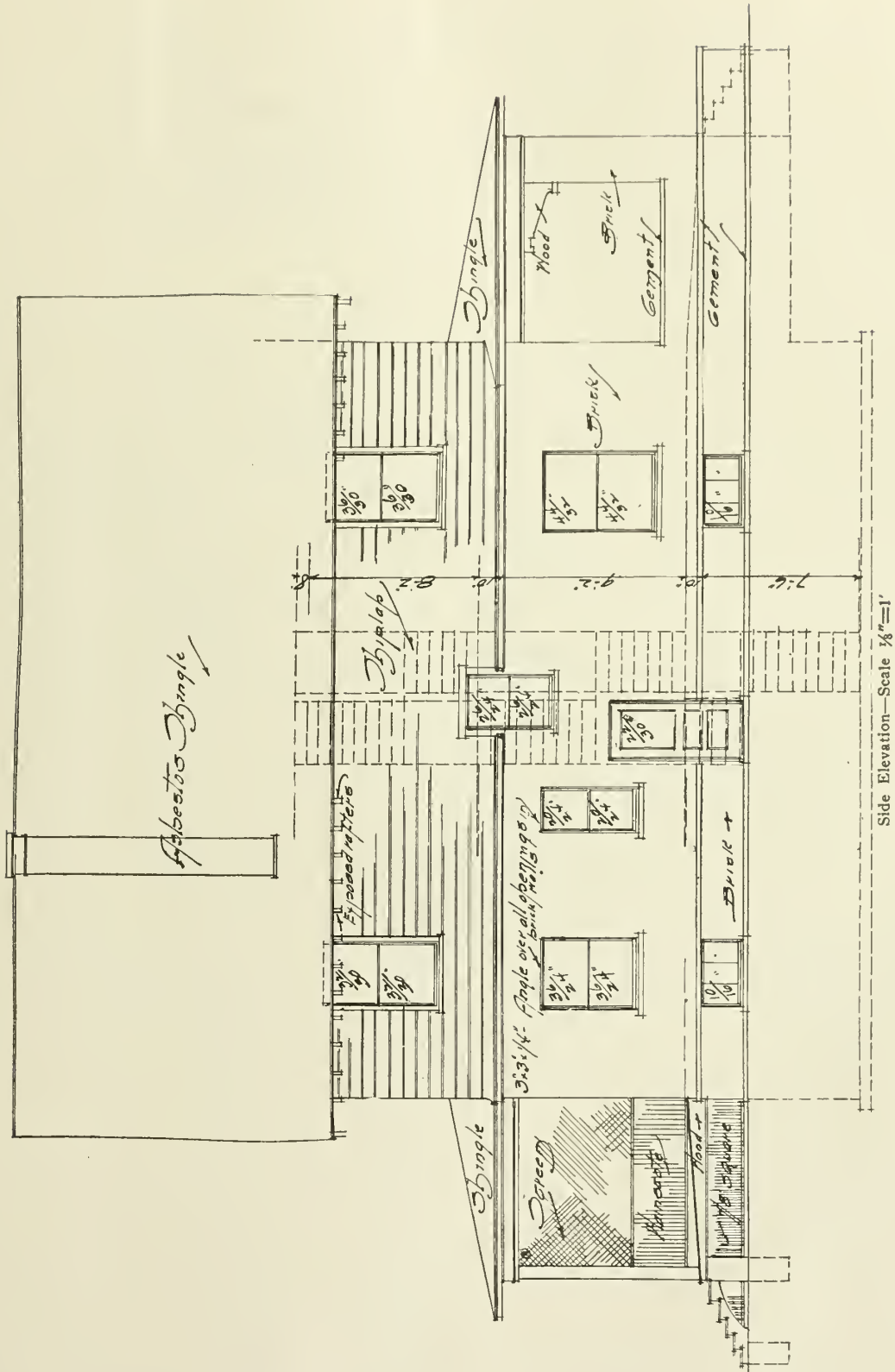
Wall Section, Scale $\frac{1}{4}"=1'$

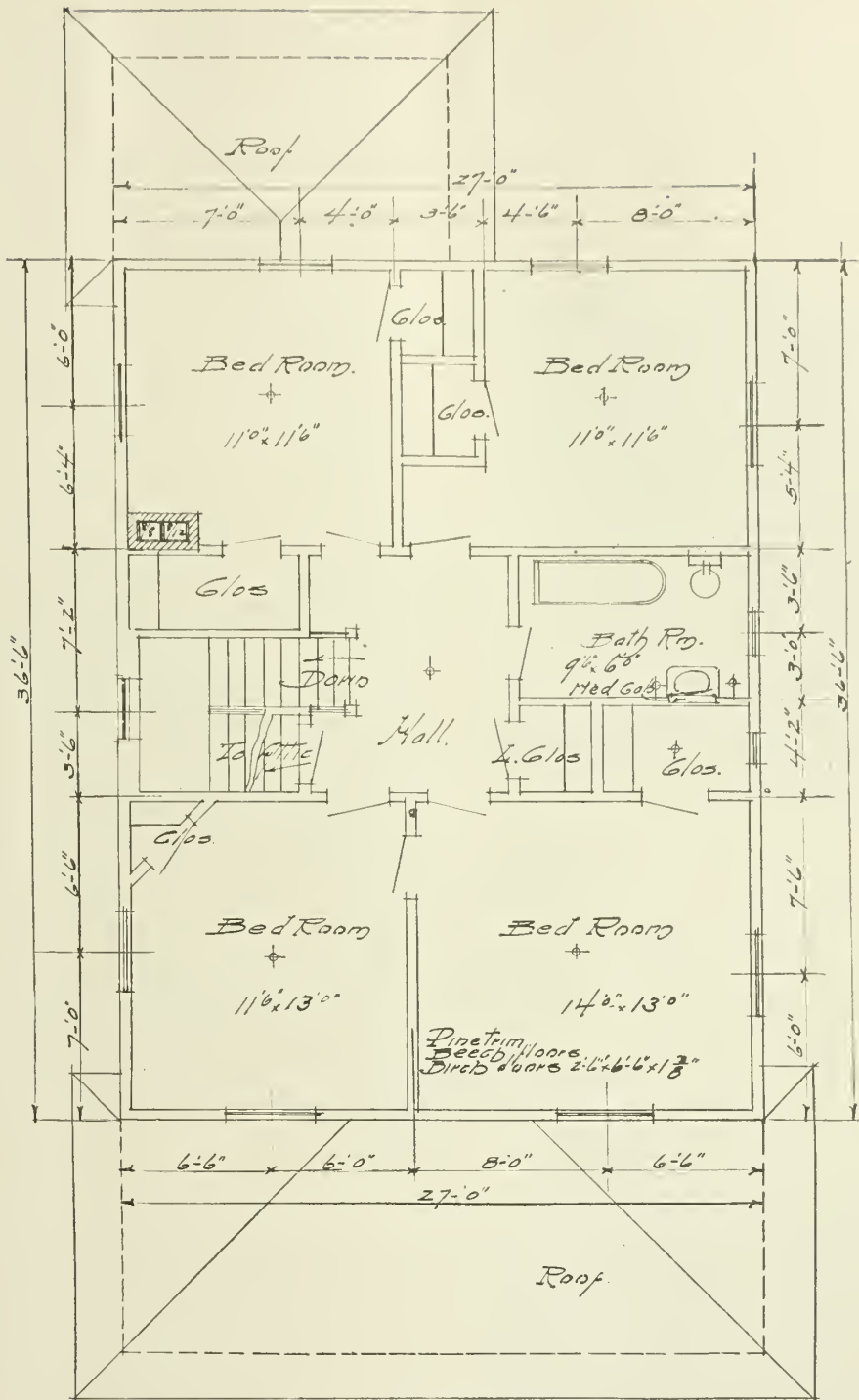


Basement Plan—Scale $\frac{1}{8}"=1'$



First Floor Plan—Scale $\frac{1}{8}"=1'$





Second Floor Plan—Scale $\frac{1}{8}"=1'$

Concrete Brick and Shingle House.

(Continued from page 51)

beech floors throughout and birch doors. The attic has a common floor.

The approximate cost for constructing this house as shown is \$2,735, estimated as follows:

Excavating	\$ 60
Concrete brick masonry and concrete..	1,000
Carpentry	600
Finish, frames, etc.....	300
Hardware	70
Painting and staining	120

Plastering	360
Wiring	75
Gas fitting	50
Fixtures	100

\$2,735

Hot air heating.....	\$160
Plumbing	275
	<u>435</u>

\$3,160

The plans are from the office of Jens C. Petersen, architect, Traverse City, Mich.

Concrete Structures on the Farm.

The two illustrations show a commendable use of concrete on the farm. These silos and the milk house were erected by R. C. Angevine, Coldwater, Mich. The twin silos built for M. D. Campbell last year near Coldwater are each 14' in diameter and 36' high, with a capacity for 120 tons of ensilage. The silo founda-



Twin Concrete Silos

tion is 12" thick, 3' high to ground and rests on a wide footing. The remaining height of the silo wall above the foundation is 6" thick. The roof is of concrete 4" thick. The doors are of steel. The same description applies to the silo shown in the same picture with the milk house built for S. S. Lee, Lowell, Mich. This



Milk House of Concrete

milk house is 14' by 20' in plan and 8' high to the eaves. The walls are double, of monolithic construction, with an air space. The building is divided by concrete partitions into two rooms, one for the milk and the other for the engine. There is no wood in the construction except in the doors and the window sash. Mr. Angevine writes CONCRETE that he believes there is a large field for concrete contractors who will devote themselves exclusively to farm work. Mr. Angevine makes a specialty of concrete silos and small farm buildings, and he believes that a builder experienced in the use of concrete for the farm should be able to build up a large business in a farm community.

Practical Concrete Construction—Arriving at Cost Figures*

BY DEWITT V. MOORE.

This paper contemplates a practical study of concrete construction with particular regard for costs and efficient methods of construction, and no attempt will be made to enter into the theory of design.

Concrete is a peculiar building material in that it is manufactured on the job, whereas, stone, brick, steel and wood are delivered on the site ready for installation into the structure. The cost of stone as delivered is determined by its quality and hardness, and distance of transportation and the cost of quarrying and dressing. The cost of the brick as delivered is determined by the quality of the clay from which it is produced, the methods of manufacture, the quality of the product and the distance of transportation, and also the cost of labor to handle, sort, and select. The cost of steel is more nearly consistent, but even this material is affected by the character of the material, the shapes into which it is rolled, the size of such shapes and the distance of transportation. The cost of the timber is likewise affected by the character or the kind of wood, the size of the pieces and the grade of the timber and the distance of transportation.

In all of the foregoing standard building materials, no man would think of bidding without first ascertaining what was required and then obtaining a price from those who were qualified to furnish the specified material.

In the case of concrete it appears that in most cases the elements entering into the construction are entirely overlooked and concrete is treated in the estimate without any regard to the varying character of materials and proportions entering into it.

This statement is not as true now as it was a few years ago, but the fact is still shown in a great many proposals.

SELECTION OF GRAVEL OR STONE.

Most specifications allow either gravel or stone to be used. Where good gravel can be obtained it is preferable from a cost standpoint to stone, and it is more easily handled throughout the entire operation of mixing and placing. Broken stone is usually obtained from quarries, and must be transported by railroad cars, unloaded by hand and then hauled to the location of the work. Gravel, on the other hand, when loaded is hauled directly to the site of the work. From a cost standpoint we have therefore two reasons why gravel is preferable:

First—Under ordinary conditions there is less manual labor connected with its delivery.

Second—There is less cost for manual labor for gravel than stone, due to the nature of the material as a laborer can do approximately 20 per cent more shoveling with gravel than with stone under equal con-

*Paper before the Indiana Engineering Society Meeting, 1912.

ditions. If the gravel is good the resulting work is equal to or better than broken stone concrete. A good gravel for concrete should be of varying sizes, wherein the sizes of the pebbles range downward in a size, say, $2\frac{1}{2}$ " to $\frac{1}{4}$ ", the proportion of each being such that there is approximately 50 per cent of each size with reference to the next largest. Concrete made of such materials will be homogeneous, dense, and of great strength. Either gravel or stone should be watched very carefully for foreign materials, such as lumps of clay from stripping the hard pan strata, sticks, decayed matter, etc. So-called yellow gravel is not necessarily a sign of weakness, although such a deposit should be carefully examined. Many times such a surface discoloration is caused by a washing over of the gravel of deposits or strata of oxide of iron or other minerals.

SELECTION OF SAND.

Much that has been said about gravel may be applied to sand, except that the sand in a sense is more important than the gravel. The sand should be relatively clean and of varying sized grains. Such a sand is much better than when of even sized particles, and I think I am safe in saying that silt up to 5 per cent will not affect the strength of the resulting concrete, but if sand is silty to any such extent care must be taken that the work is cleaned every morning. This same advice applies to the gravel, for if this is not done there will come to the surface of each day's work a soft, slimy substance, laitance, which has no strength and which will form a strata of demarcation between the successive courses.

Many times the writer has heard experienced workmen criticise the cement used because of just such conditions, on the theory that the cement rose to the surface and did not mix properly with the aggregate. Other things being equal, it is better to import sand at an increased cost, using local gravel, than to use local sand and import gravel and stone.

SELECTION OF CEMENT.

At the present time there are so many brands of Portland cement of recognized value that as far as quality is concerned little can be said.

When it comes to large and important work, however, it is well to consider the capacity of the plant and be sure of its ability to deliver the cement on time and in the quantity required.

SELECTION OF MACHINERY.

Various types of work naturally demand various types of machinery and arrangement, but in general it may be said that a small mixer is not economical. In general each batch from the mixture should be handled as a whole as closely as possible to the place of deposit. The wheelbarrow is no longer the primary method of transportation of concrete, but rather secondary, and stands in the same relative capacity as shovels, hoes, etc. There is no doubt as to the majority of opinions being in favor of batch mixers, but whatever the type adopted it would be well in the long run to install twenty to twenty-five per cent more

boiler and machine power than is specified by the manufacturer.

WHEN HAND MIXING IS JUSTIFIED.

Hand mixing cannot be expected to be as uniform as that done by machine, and yet if proper care is taken under intelligent supervision good results can be secured.

From a cost viewpoint hand mixing is preferable; first, when the work is so small as not to justify the installation of a machine. For instance, on a job of a couple of hundred yards, one hundred dollars would probably be expended in installing and rigging the mixer, or at the rate of 50 cents per yard, and it is doubtful if hand mixing would cost any more than this difference. Hand mixing is preferable in connection with large work where in order to reach isolated portions of the work it is more economical to mix by hand than to wheel long distances. Hand mixing is most important when constructing floors, sidewalks and pavements in a natural gravel foundation where it is possible to shovel material directly upon the mixing board, mix and then shovel into place upon the opposite side.

Under no circumstances can machine mixing compare in cost with this method where conditions will permit of its use.

MIXING OF CONCRETE.

For the ordinary work concrete should be mixed wet—soupy. With regard to quality, ease of handling and manipulation, resulting finish and cost of surfaces, there is absolutely no question as to this point. This method of wet concrete applies to walls, bridges, reinforced concrete buildings, etc., but for sidewalks and pavements economy demands a dry mixture requiring tamping in order that the workmen applying the finish may follow as quickly as possible after the deposit of the concrete.

PLACING OF CONCRETE.

No concrete should be placed until it is definitely determined that the forms are correctly placed and properly braced. It is cheaper to delay the work than to cut out work already done. Concrete should be placed as quickly as possible after mixing, and in its final location not to be disturbed thereafter. Placing concrete is one matter neglected. We take great care of a green brick wall, but do not hesitate to walk over and conduct operations over concrete which has not reached its final set, thereby destroying the surface of the concrete for all time. While this may not be serious in some cases, it is certainly not desirable in thin concrete slabs. Concrete is better placed through chutes than by wheelbarrows, cars, etc., for the reason that by the chute method the material is constantly kept in the process of mixing until it is deposited in the work. By other methods the heavier particles settle to the bottom and when the mixture is dumped into the work there is a separation. Chute methods also allow the placing of the concrete with the least working back and forth over the work just completed.

The ideal condition would be in the completion of work without interruption, but as this cannot be done

care should be taken in the location and manner of construction of the connecting joints as the work progresses. Breaks should preferably be made at the centers of slab spans and at the centers of girders or over the centers of columns, transverse with girders. Slab spans may be joined longitudinally over the centers of girders or beams, but this method should be considered a second choice. Columns should not be poured all at one time. Generally four feet of concrete should be allowed three or four hours in which to set before the second pouring. Slabs, girders and beams should be poured continuously up to the determined joint where stop forms have been placed. The method of pouring girders up to the bottom of the slab and then afterwards placing the slab is not desirable. The method of pouring a slab and allowing the material to slope down over the girder and then beginning the next day gives a slip slab joint which cannot be recommended.

In all concrete work stops should be made on horizontal and perpendicular lines at locations mentioned, the forms being carefully placed.

FINISH OF CONCRETE.

The surface finish of a piece of concrete should be an integral part of the main construction and of the same mixture and same composition. Time was when we were called upon to plaster and apply a surface coat to vertical surfaces. After a good many years of argument by the practical concrete workman we have reached a point where such surfaces are generally finished by spading so as to bring the finer particles to the surface and force the large particles back so they are not exposed.

We are, however, in a rut following the same old practice so far as horizontal surfaces are concerned, applying as we do a thin coating of a rich mixture on top of our cheaper concrete base. In order to secure the best results we should so manipulate our concrete as to bring our finish to the surface from the material of the concrete base. When we reach this point we will have less trouble with checking, insuccient bond, and so on, and such a method can be easily followed by the use of proper tools for tamping.

CONSTRUCTION OF FORMS AND CENTERS.

If there is one element entering into the cost of concrete which is neglected it is the cost of forms and centers. So far as is known to the writer no architect or engineer ever submits to a bidder a plan for this part of the construction. Even the specifications are vague and indefinite, leaving it to the individual contractor to plan his own work. Some go to the extreme and use a great deal more timber than is necessary; others to the other extreme and use so little and of such light construction that the work is out of line and out of plumb. When it is considered that the cost of forms and centers represents from 20 per cent to 33½ per cent in the cost of every cubic yard of concrete placed, under average conditions, it is hard to understand why the subject is not given more consideration. Ordinarily it is left to the carpenter boss to put up

something by rule of thumb and by his judgment based on past experience.

There is nothing practical about such practice. The designs for the forms of any structure should be carefully planned and designed to accomplish the results with a minimum of material and labor, giving due consideration to the maximum of salvage in the material. It is our contention that accompanying plans for any structure there should be prepared by the engineer and architect a sheet detail drawing showing how forms should be constructed, thereby insuring quality of workmanship and placing all bidders upon the same basis. If this is done there is nothing to hinder any contractor from submitting an alternate design.

TYPES OF REINFORCEMENT.

Types of reinforcement now on the market may be listed as follows:

1. Plain bars, either medium or high carbon steel.
2. Plain bars, deformed or cold worked to secure deformation.
Note—This classification includes cold twisted and hot twisted square bars.
3. Special patented types of plain or deformed patented bars.
4. Built up bars, meaning thereby combination of various sized members in order to utilize the quantity of steel to the best advantage.
5. Built up frames composed of bars of various sizes. Generally used for beams, girders and columns.
6. Floor slab reinforcement of sheet metal, sheared punched and expanded in order to distributed the steel through the mass and delivered in sheets.
7. Cold wire similar to fencing material delivered in rolls.
8. Secondary reinforcement in the way of hoops or bands for columns, stirrups for beams and spacers for rods, all of which may be made of hoop iron or wire.

SELECTION OF REINFORCEMENT.

Considering the various types just mentioned and the many modifications now on the market it is a difficult proposition to select the best, and generally the selection is determined by the price submitted by the commercial engineers bidding under a subcontract. To a certain extent this method is dangerous, but it is hard to suggest a remedy. Individual preference and experience is always a very large element. We well remember a contractor who used solid concrete slabs 6" thick, reinforced with three inch No. 10 expanded metal throughout the construction of the entire building, regardless of varying spans and varying loads, his reason being that such a construction always had proved satisfactory, and that it always rang true with a clear ringing sound when struck with a jauncing bar, and therefore there could be no question as to the integrity of the construction.

PLACING REINFORCEMENT.

The design of a concrete structure contemplates the placing of the reinforcement in exactly the position shown by the plans and cross sections of the various members. The relative strength of any member acting as a floor slab, beam or girder is as the square of the effective depth. The stiffness or ability to withstand the load within deflection is relatively as the cube of the depth. Suppose that in any such construction the effective depth of the steel in the beam is 10", giving us 100 as the relative strength and 1,000 as the relative stiffness when arbitrarily compared with any other beam of like span. If by careless placing of the steel reinforce-

ment the effective depth is reduced, say, eight inches, we have for strength a relative value of 64 per cent and a relative stiffness of 51 per cent. This is a somewhat crude statement but illustrates how careless handling of steel may destroy the most important design. Designers are usually quite conservative in their allowance for the protection of steel by fireproofing concrete below it, and the contractor might better err on the safe side and take advantage of this allowance rather than to keep above it. Many times reinforcement, and especially light bars, expanded metal and wire fabric are laid upon the forms and then afterwards manipulated by a hook as the concrete is placed, jerking the reinforcement upward so that the concrete may flow underneath. This is dangerous, inasmuch as there is no gauge to determine the final position of the reinforcement, and if the concrete flows under the reinforcement in too large a quantity it is almost impossible to replace the reinforcement without rebuilding the entire work.

Automatic spacers and devices for accurate placing of steel are readily obtainable and should be used. Naturally there is some increase of cost due to such methods but it is a cost well expended.

Especial care should be taken to place steel in girders and beams so to distribute and arrange the bars that each individual part may be incorporated within an individual part of the concrete. The reinforcement for columns should be accurately made and wired with the hoops and stirrups in place before they are erected in place, ready to build the column forms around them. While good results can be secured with bar reinforcement the author is at this time in favor of built up columns of light structural shapes for the reason that the integrity of the whole building depends upon the column construction and a failure of any one column is likely to result in the failure of the entire building. Perhaps the most important feature of the reinforcement and proper placing is that concerned with the top reinforcement or reverse flexure bars. No matter what the designer may have in mind in theory and how the bars are proportioned with reference to the main reinforcement at the center of the slab or beam, it is absolutely essential that these top bars be placed accurately and not disturbed thereafter. This is easier said than done. The main reinforcement is embedded in the solid concrete below the surface and is protected from disturbance.

The top reinforcement is close to the surface where it is affected by the future operations and also where the free ends project in case of a break at the joints in the progress of the work. These free ends if jarred will many times break the bond of the half bar extending into the work.

The placing of loose stirrups is a matter for very careful supervision and is one of the strong arguments for built-up sections wherein the stirrup shear members are rigidly connected.

Finally the employment of an expert mechanic or steel worker at increased wages over common labor

is justified by the importance of this part of the work.

PROPORTIONS OF CONCRETE.

It is very usual to specify a 1:2 ½:5 or 1:3:6 mix on plain or monolithic concrete work and the usual specifications for reinforced concrete is one part cement, two parts sand and four parts gravel, although some specify a richer mixture for columns. Inasmuch as there still exists a general ignorance on this point whereby these specifications are understood as being 1:7½ or 1:9 or 1:6 respectively it seems best that the specifications be read that a mortar be mixed of one part of cement to so many parts of sand and this mortar then be mixed with so many parts of the aggregate or gravel.

The proportioning of concrete by the selection of material or by the determination of voids of the material available will not be considered in this paper, as it is a subject by itself. We cannot overlook the fact that in the practical proportioning of concrete good judgment is necessary to insure that the mixture closely approximates the specifications.

STRENGTH.

The ideal mixture of concrete assumes that the aggregate and mortar are mixed in such a proportion that the most dense, solid, homogeneous mass is obtained. This result may be secured with expert engineering supervision, but in reality the good common sense of the expert concrete laborer may be depended upon.

The artisan who is accustomed to handling concrete can determine by the appearance of the concrete mixture and by working the mixture whether he is securing the best results, and, after a long experience, the author is inclined to say that he would just as soon trust a practical common-sense laborer's opinion as to base his work upon the report of a so-called expert engineer.

COST OF CONCRETE.

If a 1:2:6 mixture will give the necessary strength required in the construction, there is no necessity for specifying a 1:2:4 mixture, inasmuch as the first mixture will require approximately one barrel per cubic yard while the latter will require one and one-half barrels, a difference of at least 50 cents per cubic yard in actual cost. Many times for footings and monolithic work three-fourths of a barrel per cubic yard of concrete is all that is necessary—a mix of one to eight.

Why specify a rich mixture when one with less cement will answer the purpose. If the contractor is at all skilled in estimating such a cost will be included in his proposal.

ESTIMATING.

No proposals should be made upon a concrete job until a proper analysis of all the elements entering into the concrete construction is made. It is not sufficient to say or to guess that the cost of a cubic yard is so much, but instead an analysis should be made of the cost of a cubic yard of concrete under the conditions specified. There are a great many elements entering into the cost determined by such

an estimate. They are briefly stated in the paragraphs that follow:

COST OF MATERIALS.

Whether or not the concrete is to be made of a natural mixture of gravel or of stone and sand in various proportions will depend the cost of the aggregate. The amount of cement depends upon the proportions of the concrete as also does the gravel, stone and sand. Various tables have been published for these proportions, the best known being those prepared by Mr. Thatcher and that published in Taylor & Thompson's *Concrete—Plain and Reinforced*. The cost of water for proper manipulation should not be overlooked. In cities the cost of water is determined by rates of nine or ten cents per cubic yard. Outside of cities the cost depends upon the labor necessary to secure it.

COST AFFECTED BY LOCALITY.

Concrete work constructed at a remote distance from populous centers cannot be done at the same price as that in cities, unless the work is so remote that a permanent camp can be constructed and the laborers held by the very remoteness of the work. Work that is some distance from the point of supply must bear a charge for transportation, handling and hauling of raw materials. This is a labor charge which is chargeable to material, inasmuch as the materials should be considered as f. o. b. the job, but nevertheless the cost is increased per cubic yard in the proposal.

CHARACTER OF LABOR AND WORK.

Good American labor will accomplish at least fifty per cent more per day than foreign labor. American labor, however, is scarce and preferential. American labor differentiates between clean-cut concrete work under favorable conditions and concrete work under adverse conditions, excessive water and other disadvantages. The same work may cost a great deal more when built under unfavorable conditions than when built in town.

COST OF FORMS.

A wall of concrete 27 feet thick may be retained by the same forms and the same amount of form labor as is necessary for a wall one foot thick. In the latter case the form cost per cubic yard of concrete is twenty-seven times as great as in the former. It is, therefore, not safe to estimate the cost of forms on a basis of guess price per cubic yard of concrete. Each individual job should be estimated for the amount of timber work as carefully as for any other item. It does not matter whether the cost is estimated on the basis of floor foot or concrete surface or upon a basis of feet B. M. of lumber, the result is the same, inasmuch as this important branch of concrete construction receives individual consideration.

COST OF CENTERS.

There seems to be a misunderstanding as to the separation of forms and centers. Forms, properly speaking, consist of the timber work to form those members of concrete construction, such as columns, girders, etc., which must possess a certain regularity

of form and evenness of outline. Centers, properly speaking, consist of timber supports for floor slabs, bridge centers, etc.

Where the great amount of labor on timber work is expended solely for the purpose of supporting the mass at a uniform or definite height the unit cost is much less than for forming for individual members.

COST OF REINFORCEMENT.

Fabricated reinforcement will cost much more delivered to the job than loose bars, but, on the other hand, will cost much less to place in position. It is useless to say that a job on which reinforcement is made up of bars smaller than $\frac{3}{4}$ " will cost much more per ton for labor than for large sections. Good judgment must prevail in this particular. It is very seldom that an estimate will be made based on the labor and the tonnage of each size bar. Rather it is the case to strike an average labor price in harmony with the class of work to be encountered with reference to the different sizes of reinforcement. It is well to remember, however, that it takes practically as long for the steel man to place and wire a $\frac{3}{8}$ " bar as a $\frac{3}{4}$ " bar; whereas the tonnage is only $\frac{1}{4}$ as great, and this point should be kept in mind in making an estimate.

GENERAL CHARGE ITEMS.

There are a great many items of the cost of concrete work which are not included in the cost of material, labor, forms and centers, reinforcement, etc. These costs consist of installation of machinery and removing it, coal, oil, repairs and fittings for machinery; general charge items, such as rope, bolts, etc., and the loss on petty tools, such as shovels. Such costs may be determined on the basis of so much per cubic yard, or preferably they may be determined on the percentage of labor on different classes of work. No matter what the method of determination, the costs are really true and are justly chargeable as for the gravel or cement entering into the work.

SUMMARY.

In line with the foregoing remarks and the importance of a detail study of concrete we submit the estimate for a cubic yard of concrete which, according to specifications, should be of a 1:2:4 mixture to be used for the purpose of building construction and making these estimates we desire to lay emphasis on the fact that no two jobs cost the same when itemized in this way.

.9 cu. yds. gravel.....	at \$ 1.20	\$1.08
.45 cu. yds. sand.....	at 1.00	.45
1½ bbls. of cement.....	at 1.20	1.80
Water.....		.10
200 ft. B. M. of lumber.....	at 20.00	
Used four times at 20 per cent less each time used, less 40 per cent salvage.....		1.08
Reinforcement, 150 lbs., per cu. yd.....	at .02½	3.75
Total cost of material.....		\$8.26
Labor concrete.....		\$2.00
Labor forms, 80 ft. B. M.....	at 30.00	2.40
Labor centers, 120 ft.....	at 20.00	2.40
Labor reinforcement, 150 lbs.....	at .01½	.75
Total labor.....		\$7.55
General charge items proportion of labor, 15 per cent.....		\$ 1.13
Total actual cost one cu. yd. concrete.....		16.94

Each individual job that is encountered should be estimated in this way. It might not be necessary to throw the cost of forms and centers, reinforcement,

etc., into the cost per cubic yard of concrete, but, however the estimate is made, it should consider all these items and in the end the result will be the same. If in addition there is to be applied a surface coat or finish of exterior surface the cost of this must be added.

If there is any one item which adds to the cost it is the form and center work. For instance, in the detail estimate just given cost of lumber and form and center labor is \$5.88. If the work had been twice as heavy the cost of this labor would have been only half as much per cubic yard. This should bring home to every estimator the importance of dealing with a temporary structural timber work as a separate unit. Personally, the writer would rather guess at the amount of reinforcement per cubic yard than to guess at the cost of forms and centers.

The cost of labor is dependent upon the amount of concrete placed on a square foot of the area of work covered, inasmuch as the cost of placing depends upon the distance traveled and the amount handled. The greater the distance the less the quantity and the more cost per unit, and the less the haul the greater the mass and the less the cost per unit.

Such labor cost may reach anywhere from five to fifty dollars a yard, and it is suggested that a careful study be given each job to determine the amount of foot pounds of work necessary to complete it.

COST RECORDS.

It is suggested and recommended that each separate and distinct job should be given a detailed cost record, in order that future work may be properly estimated. It is a very simple matter to arrange a cost record book with a system of time reports so that such records may be obtained and recorded without increase in labor or cost.

CONCRETE SURFACES.

We have now reached a point where a proper recognition has been given to concrete as an ornamental finish. In the majority of cases on the exterior the concrete will be masked by brick, stone or terra cotta. Concrete is a better wearing material, capable of just as much ornamental treatment as other materials and such masking is obtained at an increased cost. Almost any design or reliefs in the way of ornamentation, etc., can be accomplished in the material with any combination of color or texture of surface, also if necessary with paneling in color tiles or mosaic.

On the interior, plain work is disgraced by plastering, and, if necessary, results may be obtained in the same manner as for the exterior. Such surfaces cannot be obtained at the usual price for concrete work, but they can be obtained at less cost than for the addition of other materials which are used simply for the purpose of masking the rough concrete.

Concrete on Catskill Aqueduct.

(Continued from page 39)

lock with ribs of the next one, and so on. The interlocking is secured by providing a tongue or protuberance on one end of a rib and a corresponding notch in the other. The tongue of one rib is placed in a notch of the rib next to it around the circle. We thus get a long rib of 270 degrees. Five struts are put in place at a number of the 270-degree ribs. These extend from a joint on one side to the joint opposite on the other. They are easily placed, and easily taken down. Altogether, there are about 20 such struts used in setting one section of form. The struts contact at either end, not with the joints, but with intervening longitudinals. There is a simplicity and flexibility about this form that makes it quite successful. Metal stops are employed to regulate the distance between form and pipe. When all is ready, the pouring is accomplished by means of a tube running up through the roof. This permits the cement mortar to be furnished from an outside point. The tube is arranged at one end of the form. The end selected is the lower one. A hole is left open at the other end to provide a suitable vent. No provision is made for expansion and contraction. It is assumed, perhaps, that with the pipe full of cold water and the exterior well protected there will be but a small variation in temperature.

The concrete on the outside and the cement mortar on the inside are to be considered as having no other service of importance to perform than that of protecting the steel pipe. Time will alone tell how perfectly this has been accomplished.

Reinforced Concrete Viaduct.

(Continued from page 48)

two arch spans next to the Trinity river span are of course, subject to greater temperature stresses than in the ordinary case, but these stresses are not excessive.

Gravel was used throughout for the aggregate. It was found in the vicinity of Dallas in natural beds mixed with sand. The only satisfactory broken stone obtainable in the vicinity of Dallas was that produced at Jacksboro, Texas. It is known as Jacksboro stone, and costs considerably more than the gravel. An elaborate series of tests was made by Prof. T. U. Taylor, to determine the relative merits of Jacksboro stone and Dallas gravel.

In view of results it was decided that the gravel concrete was as strong as the broken stone concrete for the 1:2:4 mixture, but that the broken stone concrete was the stronger for leaner mixtures.

"Trinity" cement, manufactured by the Southwestern States Portland Cement Co., was used. The cement was furnished to the contractors by the county. The specifications for cement were sub-

stantially the same as recommended by the American Society for Testing Materials.

The specifications for the grades of concrete were as follows:

"For the arch rings, girders, cantilevers and spandrel walls (above a plane through bottom of cantilevers), and for girders, bents, floor slabs, and arch piers (above a plane 3' 6" below the springing line of arches), and for encasing the metal work for the steel span over the Trinity river, the concrete should be composed of one part Portland cement, 2 parts sand, and 4 parts stone or gravel to pass in any direction through a 1½" ring.

"Concrete in all cross spandrel walls (below the palne of bottoms of cantilevers), in the arch piers (below a plane 3' 6" below springing line of arches), and in the two end abutments and retaining walls should be composed of one part Portland cement, 3 parts sand, and 5 parts stone or gravel to pass in any direction through a 1½" ring.

"Concrete for curbs, wheel guards, sidewalks, and parapets or copings should be composed of one part Portland cement to 3 parts of a mixture of clean sand and gravel to pass a ½" screen.

"The bases of all piers, columns and abutments should be composed of concrete mixed in the proportions of one part Portland cement, 3 parts sand, and 5 parts gravel to pass in any direction through a 2½" ring, or if broken stone is used the proportions should be one part Portland cement, 3 parts sand and 6 parts of broken stone to pass a 2½" ring."

The specifications required the use of round corrugated rods or other deformed bars of a type satisfactory to the engineer. After the contract was let it was decided to use round corrugated rods throughout. The material for reinforcing bars was medium open hearth steel having an ultimate strength of from 60,000 to 68,000 pounds per square inch; an elastic limit not less than one-half the ultimate strength; elongation of 22 per cent; the capacity to bend cold 180 degrees to a diameter equal to the thickness of the piece tested without fracture on the outside of the band.

Trinity river span has four steel girders connected by steel cross girders. All metal work is encased in concrete. The steel girders carry in direct compression the horizontal thrust of the adjacent arch spans. This thrust is carried into the bottom flanges of the girders by means of special cast steel shoes. The upright portion of the shoe bears against the concrete of the pier on one side and against the cast steel wedge on the other, the wedge being driven between the cast steel shoe and the end of the bottom flange angles. The girders are otherwise of the ordinary type of construction and the material specified is medium steel except for rivets, which are of soft steel.

At each pier on either side there is a concrete lamp standard on which there are placed three 40 candle power, 50 watt series tungsten lamps. Each

lamp is encased in a heavy 10" R. I. glass globe. The wiring system is so arranged that the center light on each post has one circuit and two side lights on another circuit, so that one, two, or three lights in each group can be used, as desired. At the Houston street stairways the lamp-standards have a single lamp only.

How to Build Concrete Cisterns.

(Continued from page 51)

wooden plug or a short section of drain tile or sewer pipe, which may be left in the roof.

Over the entire platform spread 1" of concrete. Quickly place the reinforcing of ⅜" steel rods running in both directions (criss-cross) and spaced 1' apart. Bend the ends to a hook shape and fasten them to the rods in the side walls. Immediately tamp in the remaining 3" of concrete. Increase the thickness to 3½" at the center so as to shed the roof water. Finish the surface with a steel trowel. If the tin manhole frame is to be used, grease it, set it in place and build the cover along with the rest of the roof. Reinforce the cover with short lengths of rods laid criss-cross and within 1" of the bottom. As lifting rings, use two halves of an old bridle bit or two hitching post rings, the ends provided with knobs of twisted wire or with nuts and large washers for holding the bolts firmly in the concrete. If the wooden manhole form is used, carefully remove it after five hours. After three days build the manhole cover the same as for the tin form, with this exception—place greased paper around the edges to prevent the new concrete from sticking to that of the platform. When the cistern roof is three weeks old, lift off the manhole cover and saw an opening in the wooden platform. Descend, loosen the wedges under the studs and the stringers supporting the platform, remove the forms and pass them out through the opening. To keep the settlings out of the house pipe, screw a 4" length of pipe into the joint coupling. Furthermore, the downspout should be provided with a cut-off, so that the first flow from the roof of the building may be kept out of the cistern. The cistern may be used for water storage after it is one month old.

Below is given the bill of materials and a liberal estimate of their cost.

Crushed rock, 12 cubic yards.....at	\$1.10	\$13.20
Sand, 6 cubic yards.....at	1.00	6.00
Portland cement, 21 barrels.....at	2.50	52.50
Reinforcement (112 rods—⅜"x10'), 420		
lbs. at	.02¼	9.45
		\$81.15

If ornamental features are desired, moldings or tile decorations may be used. The point to bear in mind is, that an inexpensive cistern located on top of the ground provides the country house with the conveniences of a costly city waterworks.



INFORMATION DEPARTMENT

Inquiries regarding sand and all other materials are cheerfully answered, like all other questions, but in cases of importance it is best to invest in a laboratory analysis. Write to us for particulars, address, Laboratory Department.

Boiler Settings

Please give me some information as to boiler settings in concrete. B., Pennsylvania.

See reply to K., Pennsylvania, in this issue.

* * *

Concrete Silos

I should like information as to the construction of silos of concrete. C., Vermont.

CONCRETE has published a great deal of information from time to time on the subject of silo construction, but most of the articles are in numbers which are out of print and cannot be supplied. We suggest that you write to the Agricultural Experiment Station of Wisconsin University, Madison, Wis., to the Universal Portland Cement Co., 72 West Adams St., Chicago, Ill., and to the United States Department of Agriculture, Washington, D. C., for pamphlets which are issued free on the subject of silo construction.

* * *

Smokestack Construction

I have a chance to bid on a smokestack job. I hope to knock out brick and put in a plan for a concrete stack. The stack is to be 100' high with a diameter of 42" on the inside and the foundation will go down 5'. I would like some information as to how to proceed. B., Ohio.

We are very sorry to say that it is a little outside the work of the information department of this magazine to undertake an engineering job of this kind at long range. We never undertake special designs of this kind. If you want some particular information about this kind of work, we shall try very hard to get it to you, but in a case of this kind, we can do no better than to suggest that you employ an engineer to work out the design for you. The book, *Reinforced Concrete, A Manual of Practice*, price \$1.50, will help you. The Book Department of CONCRETE can supply it.

* * *

Concrete Storage Building

There is an increasing demand among the fruit men of the Northwest for buildings in which apples may be stored. So far as I know, practically all of these buildings have been made of wood. Will you please advise whether or not concrete is a suitable material to be used in such buildings? H., Idaho.

There is certainly no reason in the world why concrete will not be a much better material than wood to

use in the construction of buildings for the storage of apples or any other produce.

Concrete is a very poor conductor of heat, and if built with double walls so that a dead air space exists in the wall all the way around and up and down, the building should be ideal for the purpose which you mention.

The advantage over wood exists not only in the fact that concrete will last longer, but it will be better for the purpose. It will be much easier to keep the cold out of a concrete building just as it is very much easier to keep the heat out of a concrete ice house, and concrete ice houses are very satisfactory.

* * *

Concrete Stucco

Please give me some information as to mixing and applying stucco. B., Massachusetts.

It is not easy in small space to give you complete information as to the application of concrete stucco. You do not tell us what the surface is that you intend to put the stucco on, whether a brick wall, a block wall or metal fabric of some kind, and we cannot give you any very definite advice.

Ordinarily, stucco is mixed 1 part of cement, 3 parts of sand and 1 part of hydrated lime. The size of the aggregate to be used depends upon the roughness which is desired in the wall. However, we would not advise your undertaking stucco work if you have not done it before, without going into the matter more fully.

A book which we publish, *How To Use Concrete*, gives complete information on the mixing and application of stucco, besides treating hundreds of other subjects in which the concrete worker is interested. The book retails for \$1.00, postpaid.

* * *

Ice House

I am figuring on building a concrete ice house 70' x 80', and I intend to erect the walls around those of an old wooden building. The walls are 24' high. I expect to run the concrete wall 12' high at first and later carry it to the top. Will it need reinforcing? B., Minnesota.

To give perfect satisfaction, the walls of an ice house should of course be insulated so that heat cannot penetrate through from the outside. Ordinarily, in constructing concrete ice houses, insulation is supplied by building a double wall, leaving an air space between the two sections, which are tied together by various methods. This may be built of certain kinds of concrete block to give a continuous air space, all around, or up and down, or it may be of poured concrete.

We suppose from your letter that you intend to build a poured concrete wall. We cannot undertake to design this structure as to reinforcing, but we refer you to the advertising pages of CONCRETE for reinforcing

materials. The amount of reinforcing depends very much upon the kind used, and we suggest that if you refer a plan of your proposed building to these reinforcing companies they will be glad to tell you how it should be used.

* * *

Concrete Walk Slabs

I am considering the matter of making concrete slabs for walks. I intend to make them in two sizes, 2' x 3' and 3' x 4', thickness to be 2½" and 3", respectively. Do you think such slabs would be durable if properly made? What materials should be used? G., Ohio.

We think you should be successful in the use of concrete slabs for sidewalks. We suggest, however, that unless you intend to reinforce these slabs, they should be thicker than two or three inches.

Of course, if these slabs are laid with good sub-grade conditions so they are perfectly level and evenly supported underneath, with proper drainage, they would not have to be so thick as otherwise, but under ordinary wear and tear a thin concrete slab would be likely to break unless reinforced.

Any good concrete walk, even though laid in place, consists of nothing but concrete slabs, because if the expansion joints are as they should be they extend entirely through the walk and leave separate slabs.

As to the material, we suggest that you use a mixture of about 1:2:4, using good, sharp sand and clean, hard gravel.

* * *

Concrete Paving

Have you published any articles on the subject of concrete streets? If so will you give us the dates of publication? S., Ohio.

We have published a great deal on the subject of concrete pavements and we list the more important articles as follows:

Bozeman, Mont., page 50, April, 1909.

Fond du Lac, Wis., page 48, September, 1909.

Knoxville, Tenn., page 45, January, 1910.

Detroit, Mich., page 69, February, 1910.

Richmond, Ind., page 54, April, 1910.

Mason City, Ia., page 70, August, 1910.

A review of various concrete paving enterprises by C. P. Chase, page 35, April, 1911.

Highway work with special reference to pavements at Ann Arbor, Mich., page 58, May, 1911.

Wayne County Road Commission, Wayne County, Mich., detailed description, October, 1911.

More of Wayne County roads, January, 1912.

In the February, 1912, issue of CONCRETE some space was devoted to the subject of reinforced concrete pavements; more particularly those laid in Highland Park, Mich.

* * *

Use of Stucco

I should like some information as to the use of concrete stucco on dwelling houses. C., Virginia.

We are very glad to know that you are interested in the use of stucco in the construction of dwelling houses. It is very difficult to give complete instructions as to the use of concrete stucco. However, a great deal has been published on the subject in various issues of CONCRETE from time to time, and the topic

is handled in several books. *How To Use Concrete*, which devotes several pages to practical instruction on the subject of stucco work, retails for \$1.00.

Stucco may be used to rejuvenate old buildings, as has frequently been done. If it is a brick building to be covered with stucco, the brick walls should be carefully cleaned, the mortar raked out of the joints to a depth of ½", the surface made as rough as possible to give a mechanical bond to hold the stucco firmly. This is also used on frame buildings by ripping off the old siding and putting on an expanded metal mesh on which to plaster the stucco.

Stucco may also be put on metal mesh which is nailed to a frame building (ordinary frame construction) instead of siding. It may be plastered on tile walls, brick walls, concrete block walls or cast concrete walls, if provision is made for a surface to which the stucco will bond.

Special concrete block are made nowadays to give a rough surface to which the stucco will adhere. Concrete tile are made to be used in the same way.

* * *

Concrete Culvert

I should like some information as to the construction of a concrete culvert. It is to be 12' between walls and will be 8" thick, including a finished top coat 1" thick of 1 part cement and two parts gravel. I would like information as to proper mix and reinforcing. L., Tennessee.

You should give us just a little more information. An 8" slab for a culvert with a span of 12' is too thin. For a span like that intended to carry heavy wagons, the slab should be not less than 14" thick and should be reinforced with ¾" square bars or ⅞" round bars, spaced 6" on centers from one support to the other, and having the same size bars running the other way of the slab with a spacing of about 15". The matter of reinforcement of such jobs is rather complicated and varies with conditions. We suggest that some work on reinforcement would help you. *Reinforced Concrete, A Manual of Practice*, is a good book for you to have. It retails for \$1.50 and may be obtained from our book department.

In the slab of the culvert use a mixture of 1 part best Portland cement, 2 parts of clean coarse sand and 4 parts of clean screened gravel or broken stone with pieces ranging in size from 2" down to ¼" cube. Not more than one-fourth of it should be over one inch cube in size. The cost of the materials, the mixing and placing will total up to about \$4.00 per cubic yard, or about 15c per square foot. The cost of the reinforcement, together with the placing, will be about 12c per square foot. The cost of the frame work is hard to estimate at a distance, and especially hard to estimate when unit costs are unknown and the experience of the men engaged in the work is unknown. A general estimate to cover bracing, etc., might be set down as equal to 15c or 20c per square foot.

* * *

Water Table Cracks

I am building a house of concrete brick on a stone foundation. The foundation is 2' thick on sandy soil and goes down 5'. It has been down a year. When work on the upper walls was begun there was no sign of settling

in the foundation. On top of the foundation I laid a concrete water table, casting it in place, 7" thick and 12" wide with a projection over the foundation of 2". I started the brick back at the 10" mark, after the water table had set for three days. I raised the brick wall 8' 6" in 13 days from the time of starting. Now the water table is badly cracked. There is, however, no sign of settling anywhere. I made the water table concrete of a 1:6 mix with good gravel and I made it wet enough to puddle. I shall take the wall down again and I would like to know what is the matter. P., Michigan.

In a case of this kind, we are always somewhat at a loss to know what to say, for the reason that a long-distance opinion on the cause of construction cracks is seldom much better than a guess. Our first thought would be that the foundation was at fault, but you say that this portion of the construction was a year old, and unless the soil is unusually unstable should have given no trouble. Are you certain, however, that the foundation did not settle? It is just possible that it settled in a mass, in such a manner as not to show noticeable cracks in itself, but with the effect of breaking comparatively thin concrete construction placed on it.

How wide is your wall of concrete brick? You do not say, but we take it for granted that it was not more than 1' thick, over all, and you were building it hollow. There should have been nothing to damage the watertable in the way of wall weight. Do we understand that the concrete watertable was three days old when you began the construction of the brick wall above it? The mixture of 1:6 was certainly not very rich, and when you rebuild we suggest that you make use of a mix of about 1:2:4.

Better examine that foundation again, and carefully. Look carefully to the corners and see whether or not any cracks have started there. Please let us hear from you again.

* * *

Concrete Boiler Settings

Can you give me any information about boiler settings of concrete? I have been told that concrete may be used successfully for this purpose and I would like information as to cost compared with brick. K., Pennsylvania.

There appears to be no doubt about the practicability of concrete boiler settings but there is some question as to the cost. In small boiler settings brick is said to be cheaper.

In a letter to CONCRETE on this subject, Ernest McCullough* says:

"A boiler setting does not cost very much when laid up in brick. The making of the forms for the masonry work connected with a boiler setting will in most cases cost fully as much as the brick work. The actual cost of the concrete will be fully as much as the brick for it takes such a small quantity of concrete. Therefore, the cost of a reinforced concrete boiler setting in the majority of cases will be much higher than the cost of brick work.

"The temperature variations in the walls of boiler settings are excessive and when the wall is a monolith, as when concrete is used, it will be impossible to avoid cracks, except with reinforcement, even when some lining of firebrick is used. If the concrete is used in the form of block or brick, thus affording many joints in which the effects of expansion and contraction may be dissipated, it might be all right to use it for boiler settings. If not used in this form but as a monolith then there will be required so much reinforcement that the expense will be very great. There is no certainty either that

the reinforcement will entirely prevent cracks without a fire brick lining.

"It is just possible that concrete has been used in some places for this purpose, but so far all the efforts I have made to ascertain the facts have been fruitless. A great many men have had inquiries and all hold the opinions I have expressed, and none know where concrete boiler settings have been attempted. Twice I have put in specifications on which the owner would take figures for concrete or brick, but in one case the brick was used. In the other case the owner was laughed out of it by the contractors and no one took him seriously. They all said that the forms for the concrete would cost almost as much as the brick work and there was so little concrete and it had to be in such special shapes that the cost would be very high.

"In the case of brick, a fire could be built within three or four days, but if concrete was used it would be necessary to give not less than a month for seasoning. In the case of boilers of over 100 horse power, where there will be used more than twenty thousand brick for each boiler, it pays perhaps to investigate the use of concrete for the exterior walls, having a hollow space in the walls, with the inner section heavily reinforced and also with a fire brick lining. In such cases, the interior arches, etc., can be of fire brick.

"Such construction might be cheaper than brick work for the walls will be heavy and contain a great many brick. Appearance will not count for much so the forms may be less carefully made than if used for exterior walls. This will cut down the cost of form work considerably.

"Frankly, however, I would not advise a client to use concrete for boiler settings, but would not hesitate to prepare plans and specifications for such work if he insisted upon it. I would in such a case, however, advise him to take alternative bids for concrete and brick, as was done in the two instances mentioned."

CONCRETE will be very glad to hear from readers as to experiences along this line. Several letters of inquiry have been received and there appears to be no very complete information on the subject.

* * *

Concrete Pipe

We should like information as to concrete pipe. We make our sewer tile with machinery which requires a dry mix. We are sending you a piece of the ordinary 8" pipe which has been cured inside the factory for about forty days, and since that time, or about three months, has been out in the sun without any further water. As you will note it has a coat of neat cement on both the inside and the outside which makes it waterproof, as tests have proven that the pipe will, in nearly all cases, fracture before it will leak. This pipe all stands a crushing test of over 1200 pounds to the linear foot but being somewhat green it fractures between twenty-five and thirty pounds. Some that had been placed in the sewer here for six weeks was taken up and found to have increased in crushing strength over 500 pounds to the linear foot and also stood eight pounds more fracture test; this special pipe being a much poorer pipe, owing to the aggregate used, than what we are making now. We claim that because this pipe has to be made with a dry mix it requires a longer time to cure and that it should be put in the ground where it will get the proper moisture and that in a few months it will have become much stronger and more impervious, and finally will be able to withstand almost any pressure ordinarily required of sewer pipe even under the most trying conditions. In this city the maximum pressure that will occur on the sewer system will not be over 10 pounds to the square inch. Yet the city engineer says he cannot recommend this pipe, and about the only reason he has is that it is made of the dry mix and will disintegrate. What we want to know is whether or not you can send us some literature or tell us where we can get at some which goes into the matter of concrete pipe versus the clay pipe, that we can use to advantage. R., Nevada.

We are frank in saying that the sample does not impress us as being very good concrete. It shows strong

*1303 Monadnock Block, Chicago, Ill.

evidence of having been made of a very dry mix indeed, probably not more than "earth moist." The result is that the body is not at all dense and the concrete fractures rather easily, under a comparatively light blow. After fracture, the surface is readily rubbed off, showing poor adhesion of the mortar. You are undoubtedly familiar with the fact that unless sufficient water is supplied to Portland cement to permit the action of crystallization to be set up and continued to completion, the cementing power of the product is not brought out.

Our recommendation to you is either to use more water in your mix or to use steam curing. Tile are best made when they are mixed so wet that they will *just* stand without sagging when the molds are removed. Steam curing, in which the tile are exposed to an atmosphere saturated with moisture immediately after leaving the machine, gives excellent results.

C. W. Boynton, in charge of the laboratory of the Universal Portland Cement Co., Chicago, Ill., is one of the leaders in the fight for concrete tile. He can supply you with abundant ammunition to combat what your city engineer thinks and will no doubt be glad to do so upon receipt of your request.

Properly made concrete tile have no superior and we shall be glad to do all we can, not only to help you make them but to see that your product is given proper consideration.

* * *

Furniture of Concrete

We have been very much interested in the article in the January number of CONCRETE dealing with concrete

furniture. Will you tell us if it is a fact that there is a concern recently organized for the manufacture of such furniture? If there is a field for such a product, we would like to get into it. G., Ohio.

We are very glad to know that you are interested in concrete furniture, and while concrete furniture is by no means a joke, we believe that its manufacture has not progressed very far.

The article published in the January issue of CONCRETE was prompted by many notices in the public press that Thomas A. Edison declared that concrete furniture would be used, and A. A. Houghton, who wrote the article, has done some experimenting in making some articles of furniture, using expanded metal plastered over with concrete. We believe, however, that Mr. Edison is quite serious in the matter, and we know that he has made at least a start in the line of his prediction, as shown by the illustration of a phonograph cabinet which he made. This really is about all the information we have on the subject at present.

E. E. Love, Correy, Pa., writes CONCRETE with reference to an article by Ernest McCullough, in the January, 1912, issue of CONCRETE, which tells how to make basements watertight. Referring to Mr. McCullough's suggestion about making the floors heavy enough to hold the water down by their own dead weight or else reinforcing the floors to withstand the upward pressure of the water, Mr. Love says: "Why not stake the floors down and reinforce the concrete? In other words, drive a series of wooden stakes below the floor to be laid and fasten reinforcing to the top of these stakes. If this work is well done the concrete floor could not be forced up." Mr. Love also says that to get rid of the water in the excavation until after the concrete floor is down and thoroughly set, ordinary drive wells can be put down outside the walls to keep the water drained away. He says this should work well in gravel soil, but in clay larger holes would have to be dug.

Severe winter weather has not interfered particularly with the concrete foundation wall for the new Union Station in Kansas City, Mo. F. W. Winters, superintendent of construction for the Geo. A. Fuller Construction Co., writes that he has been able to take care of the concrete properly in cold weather by having large quantities of torpedo sand stored up in light piles over perforated steam pipes. The piles of sand are covered with tarpaulins so the heat does not readily escape. A 75-gallon tank is used in connection with the concrete mixer and steam pipes run into this tank, which is filled with water used in mixing the concrete. By turning on the steam the water can be brought nearly to the boiling point in about two minutes.

A movement on the part of Western Classification Railroads to increase the freight rates on empty cement sacks and other containers has been defeated, and there will be no increase over the present rates at this time.



Edison's Concrete Phonograph Cabinet



Trinity Methodist Church, Lincoln, Neb., built of white and granite faced brick. One Peerless Machine made them faster than the workmen could lay them. Brick made by Lincoln Stone & Supply Co.

The above is an example of the work that the Peerless is doing every day. In quality of product the

Peerless Brick Machine

Has No Equal

The Peerless is made of high grade carbon steel and heavy malleable iron; it can't spring out of alignment as will sheet steel and angle iron, and will outlive its owner.

We guarantee its construction in the following unparalleled guarantee: If machine is broken or injured in operation we will replace any broken or injured part free of charge as long as machine is in the hands of the original purchaser. Will others do this?

Cement is at the lowest price ever known. Buy the machine that will make money for you. Write for catalogue and booklet on cement brick.

Peerless Brick Machine Co.

9 North Sixth St., Minneapolis, Minn.

Capacity
12000
per day





The Twentieth Century Bridge

Lowest final cost and best service.

Rustproof, fireproof, floodproof, frostproof.



Erection of Forms for Bridge at Liberty, Mo., Excelsior Springs Division

Bridges and Culverts of Concrete

(Continued from page 31)

reinforced, ten times the compression in contiguous concrete; tension in steel, 16,000 lbs. per sq. inch.

The reinforcing consists for the most part of plain round medium steel from $\frac{5}{8}$ " to 1" in diameter as re-



Above, a 20-foot Span Bridge Near Excelsior Springs, Missouri.

Below, Cribbing for Foundation of 25-foot Span Bridge at Dearborn, Missouri

quired. High carbon deformed bars were used to some extent where the mild steel could not be obtained from stock. The concrete is composed of one part cement, two parts sand and four parts stone in the superstructure. The foundations are composed of one part cement, three parts sand and five parts broken stone. Large rock was also used in the foundations where it could be obtained easily, and where it could

be entirely surrounded by concrete in sufficient thickness. Standard Portland cement manufactured at Dewey, Okla., was used; the sand was Kaw river sand shipped from Kansas City; the stone was mostly crushed along the line by portable crushers, but where convenient to a railroad station it was shipped in from Kansas City and St. Joseph. All the stone was gray limestone of $2\frac{1}{2}$ " size and under.

The allowable pressures in tons per square foot on foundations were as follows: Rock, 25; hard-pan, 10; coarse gravel cemented, 7; clay, 3; sand confined, 2.

Every kind of foundation was encountered from solid rock to silt. This required a modification of the foundation plans in many instances to meet the allowable pressures. Piles were used in some cases. Flood-proof pavements were used in the shorter spans and where the nature of the soil made it desirable to protect against washing.

The wings were designed for an earth fill of a slope of $1\frac{1}{2}$ to 1. The wings extend to the full depth of the bridge foundation and are uniform in general design throughout the work.

An illustration shows some of the false work on one of the larger bridges. The lagging consisted of 2"x6" yellow pine 16' long. The circles were cut at a planing mill in Kansas City and shipped to the bridge site. The uprights consisted of two 2"x6" pieces placed in the shape of the capital letter "T" and wired together about every four feet, with No. 10 wire.

When the forms were to be removed these wires were cut, allowing the uprights to buckle gradually, and were later removed.

The construction work on the bridges commenced the first week in October, 1911, and when it was stopped by the cold weather, December 26, 70 of the bridges were entirely completed, and of the remaining 46, all but 12 of the smaller ones were under construction.

As it is intended to have the road in operation by the fall of 1912, these structures were rushed to be out of the way of the grading contractors. Thirty-five gangs were at work a good part of the fall and early winter. This road is said to be making a larger

percentage of its improvements of permanent construction than any other railroad built in the west.

The construction of the bridges was carried on under the supervision of the Topeka Bridge & Iron Co., using the Luten patents of the National Bridge Co. A single line of reinforcement of smooth, round bars was used in the pavements, walls, and arches, the method of bending and tying being such that the required stresses are carried, using considerably less concrete than is necessary in arches of other designs built to carry equal loads. Wherever the nature of the ground was such that there was a possibility of floods undermining the foundations, reinforced pavements were laid in the bed of the stream, the reinforcing rods passing into the abutments and being tied to the arch rods. The bed of the stream is thus made a constant grade at the bridge, with the idea entirely to eliminate a possibility of undermining.

In constructing the smaller bridges, of which there are about 95, an excavation was made the full length of the bridge and the full width back to back of the abutments. The foundations were then concreted to the bottom of the stream pavements. The reinforcing rods for the pavement were laid in place and the pavement concreted in. The forms for the arches, spandrel and wing walls were erected over the pavement and the arch rings concreted in longitudinal sections, the outside sections being run together with the spandrel and the wing walls. The coping and pilasters were then concreted and the bridge completed.

Starting operation late in the fall, it was necessary to push the work with greatest possible speed at as many locations as were available along both lines in order to complete a large percentage of the bridges before freezing weather should stop the concreting. A branch organization with headquarters in Kansas City, Mo., was established. This office, in charge of an engineer, revised plans, figured estimates, made up the bills of materials, purchased and directed the shipment of materials, tools and machinery, issued the pay roll, paid all invoices and freight bills and operated as a headquarters for the field organization.

The field force was in charge of a superintendent and assistant. It consisted of thirty-three foremen, 750 men and 235 teams. The latter were mostly engaged in delivering materials to bridge sites from the nearest railway stations. The haul was from one to six miles. Each foreman worked independently of the others, being supplied with a complete set of tools, a concrete mixer, pumps, etc. The form lumber and reinforcing rods were shipped in proper quantities and sizes required for each particular bridge. Upon the completion of a bridge, the gang and tools were removed to another location in the immediate vicinity and the work proceeded without delay. By a complete system of reports the office was kept in touch with the progress being made on each bridge. The contract amounted to about \$300,000 and approximately 90

per cent of the whole was completed in 110 working days.

CONCRETE is indebted to the Topeka Bridge & Iron Co., Topeka, Kans., the contractor on this work, for these bridge building data. The three-color plate in this issue illustrates one of the company's reinforced concrete railway bridges in Allen county, Kansas.

Concrete Merger Nearing Completion

Following a score of conferences and many weeks of preliminary work, another all-day meeting was held in Kansas City, Mo., February 21 by the representatives of the Portland cement companies in Kansas, Oklahoma, Texas and Missouri.

The long-discussed merger of these companies is now said to be near completion. The first step at this meeting was to hear the report from legal representatives, who informed those interested that, in their opinion, a merger of the cement industry of the Gas Belt district would in no way be in violation of the government's anti-trust laws. A committee was named to perfect an organization and draw up by-laws and articles of incorporation. L. C. Mitchell, St. Louis, treasurer of the Iola Portland cement Co., was made chairman of this committee.

The plan is that after the organization has been formed and agreed upon by the representatives of those concerned, the several companies will sell their properties, and all of the stockholders of the merged cement companies will sell out to one concern. New articles of incorporation will be filed and new officers will be placed in control. In all probability an eastern man will be chosen as president and general manager. The stockholders will be issued stock in the new consolidated company. The fifteen companies will go out of business, and one company will absorb all the cement holdings.

The stockholders, like the managers of the plants, have come to believe, it is said, that a merger is the only thing which will aid the cement business in the great West and Southwest. By reducing various expenses, such as office rent, administrative heads, clerks, salesmen, freight, etc., the merger will create a saving of at least \$1,250,000 the first year. According to Chas. H. Appel, general manager of the Great Western Portland Cement Co., the merger is a necessity if the cement plants are to operate. For some time it is declared there has been a loss of 30 cents a barrel in the manufacture of cement. This has been due to the undercutting of prices on the part of some companies and to freight rates. Competition being removed, cement will be shipped to its destination from the nearest mill. The cement industry in the Gas Belt section is purely a local proposition in a financial way. It is estimated that more than 85 per cent of the stock of the companies concerned in this merger is owned in Missouri, Kansas, Oklahoma, Texas and in states west of the Mississippi. The deal which is to be

consummated represents a consideration of approximately \$35,000,000.

The American Appraisal Co., Milwaukee, Wis., was employed to appraise the plants. The mills included in the merger have a total capacity of 12,000,000 barrels a year, while the consumption in the territory which they now serve is only 7,500,000 barrels. Another meeting will be held in Kansas City at the time of the cement show, where a report will be made by the committee on organization.

Concrete Wins in Sewer Pipe Fight

(Continued from page 33)

"Concrete Pipe vs. Clay Pipe." For days and weeks this subject was before the Board of Public Works—sessions being held late into the night—and both concrete and clay industries presented claims, reports and tests.

Thomas R. Marks appeared for the W. S. Dickey Clay Co. and the Clay Products Manufacturers' Association. R. E. O'Malley and E. C. Meserve represented the concrete pipe men, cement manufacturers and mixer men. In the dissension and discussion which resulted in the combat, there can be little interest. There were reports and counter reports, hearings and more hearings. The clay people fought hard but they couldn't combat reports of tests and reports of actual experience with concrete pipe.

There is no better way of showing the lasting qualities of concrete sewer pipe than by reports of cities which have used it for a considerable length of time. The trend of all such reports seems to be that it has proven its superiority over clay in every instance where the two pipes have been brought in fair comparison.

Concrete is acknowledged today as the most indestructible of all materials used for sewer construction. Plain monolithic concrete was first used, to be superseded now in many instances by reinforced concrete on account of the greater strength and increased economy which the reinforced construction gives for large work. The pipe manufacturers declare that there are certain serious objections to the construction of reinforced concrete sewers in the trench, that the position of the reinforcing metal is bound to be more or less uncertain, thereby vitally affecting the strength of the structure. The very fact that the sewer is built in the trench makes it difficult to assure the proper inspection which will bring to light the defects in the concrete itself. And their presence, undetected at first, may lead to serious results. Another obstacle has been the difficulty of successful sewer building by this method through ground of a soft, uneven formation.

To overcome these varied obstacles, there has developed the method of building the sewer in short sections, each properly reinforced, and uniting them after they are placed in the trench. This method has been shown economical and permits rapid laying of the line. It also possesses the advantage of great lasting quality.

The Gilligan lock drawbar used by the Kansas City Concrete Pipe Co. to unite the sections of sewer or culvert does not depend upon the concrete grout at the

joint to hold the pipe together. It is a lock in itself and the grouting of the joint is only made to fill the space between the sections.

When used as ordinary sewers, as in municipalities for conveying domestic and street sewage, it is found that sewage increases the strength of concrete—that there is no deterioration whatever. The real value and superiority of concrete as a material for the construction of sewers is chiefly noticeable when comparing the cost of maintenance per mile of sewers built of concrete and those constructed of any other material. Concrete possesses the unique quality of becoming stronger with age.

Advantages of concrete over vitrified clay pipe can be enumerated as follows, when both are well made of the best and most substantial materials:

1—A sectional form can be given concrete which is more conducive to stability and efficiency than round clay pipe.

2—As vitrified pipe warps in burning, the section is not finished truly circular, and slight projections are formed at every joint when the pipe are laid to form a sewer. These projections are more or less objectionable in a sewer, because matter catches and is retained thereby. Concrete pipe, whether circular or egg shaped, do not warp, and therefore can give a sewer an even surface upon which the sewage can flow.

3—As concrete pipe have a truer sectional shape than vitrified pipe, they can be given a slanting butt joint, as is customary, instead of the more costly bell and spigot joint common for vitrified pipe, which are made in imitation of cast iron pipe used under high pressures.

4—Concrete pipe, if well made of proper materials, have great strength in resisting compression, tensile and bursting strains which is amply sufficient for all purposes of sewers in large cities.

Convention Arrangements of N. A. C. U.

(Continued from page 35)

Floors, C. W. Boynton, chairman; Report of Committee on Education, Logan Waller Page, chairman.

FRIDAY, MARCH 15.

9:00 a. m.—Meeting of the Section on Roadways, Sidewalks and Floors; Topical discussion covering the Preparation of Materials, Laying, Finishing, Costs. 10:30 a. m.—Report of the Committee on Building Blocks and Cement Products, P. S. Hudson, chairman; "Advantages and Durability of Cement Sewer Pipe," Gustave Kaufman, engineer, The Wilson & Baillie Manufacturing Co., Brooklyn, N. Y.; "Cement Drain Tile," A. Marsten, dean School of Engineering, Iowa State College, Ames, Iowa; "The Manufacture and Use of Cement Drain Tile," Charles T. Sims, Worthington, Minn.; "Methods of Testing Cement Pipe," Duff A. Abrams, assistant professor, University of Illinois, Urbana, Ill. 8:00 p. m.—Reception and Banquet, Hotel Baltimore.

SATURDAY, MARCH 16.

9:00 a. m.—Meeting of the Section on Building Blocks and Cement Products; Topical discussion on the Manufacture, Curing, Cost, etc., of Cement Products. 10:30 a. m.—"Concrete Fence Posts," W. J. Towne, engineer of maintenance, Chicago & Northwestern Railroad, Chicago, Ill.; "Some Notes on the Value and Comparative Cost of Reinforced Concrete Telegraph Poles," George Gibbs, chief engineer of construction, Pennsylvania Railroad, New York, N. Y.; "Concrete Piles and Harbor Work," Dmitri Alexeev, engineer, Russian Northern Railway, Moscow, Russia; "Reinforced Concrete Piles," Robert A. Cummings, consulting engineer, Pittsburgh, Pa.; "The Concrete Block Industry in Russia," Alexander Zuberhuhler, engineer, Moscow, Russia; "Modern Methods of

Manufacturing Concrete Products," Robert F. Havlik, engineer, Ideal Concrete Machinery Co., South Bend, Ind. 8:00 p. m.—"The Use of Concrete in Irrigation Work," F. H. Newell, chief director, U. S. Reclamation Service, Washington, D. C.; "Reinforced Concrete in Agriculture," W. A. Collings, engineer, Builders' Material Supply Co., Kansas City, Mo.; "The Handling of Concrete in the Construction of the Panama Canal," S. B. Williamson, engineer, Pacific Division, Panama.

Two New Methods in Concrete Paving

(Continued from page 36)

additional strength is given to the rail by an interior web 3" thick. The rail is reinforced with four $\frac{3}{8}$ " square bars at the corners, with a loop at each of the webs. These rails rest on reinforced concrete posts 6' 6" long and 5"x7" in section. The guard-rail cost 50c a linear foot.

Another concrete pavement which has attracted a great deal of attention lately is that at Ann Arbor, Mich. This was described in CONCRETE in May, 1911, in a paper by W. A. McLean. The pavement was devised by E. W. Groves, City Engineer of Ann Arbor, who, purely as an experiment, covered the surface of his concrete pavement with a coating of coal tar and sand. The concrete pavement consists of a base of gravel concrete 4 $\frac{1}{2}$ " thick and the wearing surface 1 $\frac{1}{2}$ " thick, of 1 part cement to 2 parts sand. The concrete is laid in sections one-half the width of the street and 25' long. Expansion joints were placed every 25' across the street and at each curb. The concrete is given a float finish, slightly roughened with a stiff broom. Pavement is laid on half of the street at a time, and when entirely completed and the concrete hard, the surface is covered with hot bitumen from a sprinkler wagon contrived for the work. This sprinkler is followed by a street sweeper which distributes the covering so that one-half gallon of the coating covers a square yard of surface. The surface is then covered with sand, 1 cubic yard being required for every 230 square yards of surface. Ordinary coal tar was first used for this work, later distilled tar was used, and lately tarvia has been employed. With labor at \$1.75 a day, cement at about \$1.25 a barrel, gravel at 75c per yard, the cost of the pavement and the wearing surface has varied from 71c to 88c per square yard, and the total cost, including the grading and the curbs, has been a few cents more than \$1.00 per square yard. The streets are 30' wide.

Winter Concrete Construction

(Continued from page 36)

bottom of the barrel. A pail or a pail and one-half of brine, as the case may require to carry the proper weight of salt, has been added to each batch as it is put into the mixer, thereby insuring perfect mixing. This is believed to be the only safe way to add salt,

Salamanders have been used after placing each floor. When the forms for the columns and floors were in position the entire building was surrounded with canvas reaching up and over the wall beams, and hanging down below the floor. It is drawn in

somewhat at the bottom. As many as forty salamanders were used in the area of the building, which approximated 6,000 square feet of floor surface. Some of the time when the concrete was curing the temperature was down as low as ten below zero. Usually it was found quite possible to keep the average temperature inside the canvas at thirty, or when running the salamanders very hard, at forty degrees above the temperature of the atmosphere outside. Special precautions were taken to prevent the bases of the columns from getting chilled by keeping out the draft at these points, and keeping the salamanders as close as possible to the columns.

In order to prevent possible ignition of the forms from the red hot salamanders in which coke was burning, chemical fire extinguishers were placed at accessible points of the building and a night watchman was always left in charge of the salamanders.

The length of carriage from the mixer to the point where it is placed on the Lamson job has averaged less than 100'. The method of distribution in cars which take an entire four bag batch at one time has helped to retain the heat in the mass. The spouting system has not been attempted in the cold months as it has seemed to be out of the question by reason of the thin stream of concrete becoming frozen upon the sides of the chute.

The same contractors have carried on the construction of the Larkin company's ten-story warehouse at Buffalo, N. Y., in the severely cold weather, the last four stories having been concreted by the contractors when the mercury was far below freezing. This reinforced concrete structure is 580'x109' in plan, and contains over fourteen acres of floor space.

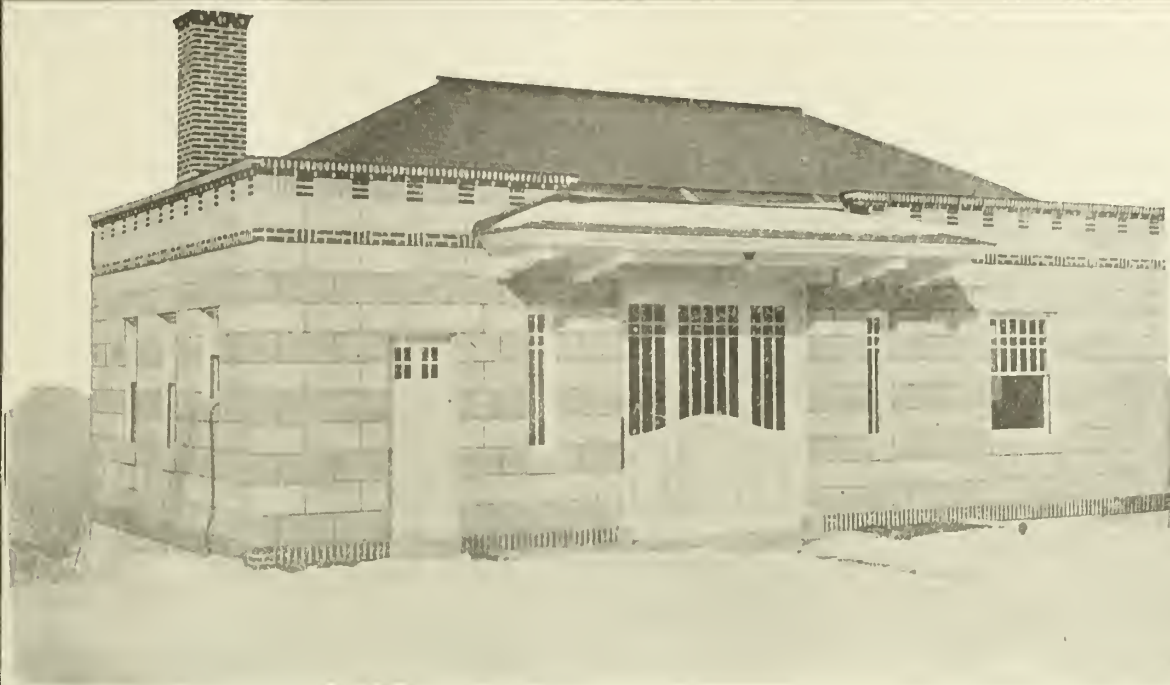
On this work there are two distinct mixers and hoisting towers located at thirds of the building's length. Back of these and across the road, kept open to traffic, are cement sheds and stone bins, all of which are connected to the mixing plant by industrial tracks.* The gravel used is dredged from the Niagara river and has in it sand and stone in approximately the proportion needed for good concrete work. In the summer the gravel was received on Erie railroad cars and hoisted directly into the stone bins, but when lake navigation had ceased it was piled in the street, and heated by a 2" steam pipe carried from one of the 30 h. p. boilers in the temporary boiler house. The steam pressure used generally has been at 40 lbs. per square inch. Some idea as to the temperature to which the aggregate is heated may be gained by noting that when it is discharged from the rotary dump cars it is so hot as to be uncomfortable to the hand.

Salt is added to the water, generally in the proportion of about 2 lbs. of salt to each bag of cement, as on the Lamson job.

Some of the most severe winter conditions were experienced by the contractors when concreting the platform for the water tank. This is about 20' above the general level of the roof and approximately 140' from the street level. The concrete after it had been

(Continued on page 76)

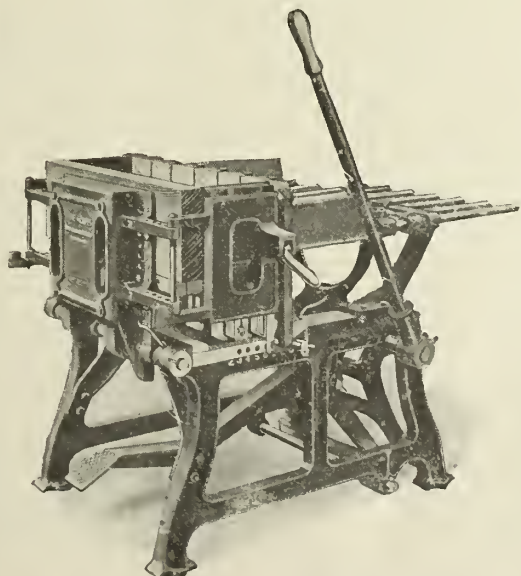
*This plant arrangement was described in CONCRETE, February, 1912.



This garage was built with a Hobbs Block Machine by Sturtevant & Hook, New Bedford, Mass. It was designed by N. C. Smith, one of the leading architects in New England. Only since they bought a Hobbs have Sturtevant & Hook secured block work through architects. Now most of their work comes from that source. The plain block for this garage are 12" high, were set by Mr. Hook in alternate courses of light and dark granite faced block. Tapestry brick was used for the trim. Ask Sturtevant & Hook if the Hobbs is a money maker.

THE vast superiority of the Hobbs Block Machine is remarkable. If you want the best there is no second choice. Our success is evidence of this and our customers are the most intelligent and progressive men in the block business.

Q Some of our customers specialize on making good block cheap and with a Kramer Tamper produce from 400 to 600 8x8x24" blocks a day or their equivalent in fractional block, for understand that by reason of the Hobbs automatic dividing plates fractional block are made just as quick and just as easy as whole block. This feature together with the action of our oval cores makes the Hobbs the fastest block machine made of any kind and we can prove it. Remember that block made cheaply with the Hobbs don't appear cheap for our Composition Face Plates produce a natural rock face no matter what material is used.



Q Quality work, however, is what we advocate for it always pays. Those of our customers who have specialized on high class work have reaped a harvest. Some Hobbs customers thought first there was no demand for fine work but they soon found that Hobbs block created such a demand. Bear in mind that every fine block job is an advertisement for you and every cheap job is an ad against you. "Quality is remembered but price is forgotten."

Q Since we legally guarantee that every machine we sell must give you entire satisfaction—must do as we say it will—you cannot lose if you buy a Hobbs. Protected by such a guaranty you can order a Hobbs by mail, as have many of our customers. Write first for our catalog, and do it now.

HOBBS CONCRETE MACHINERY CO.

933 SCOTTEN AVENUE
DETROIT, - - MICHIGAN

Winter Concrete Construction

(Continued from page 74)

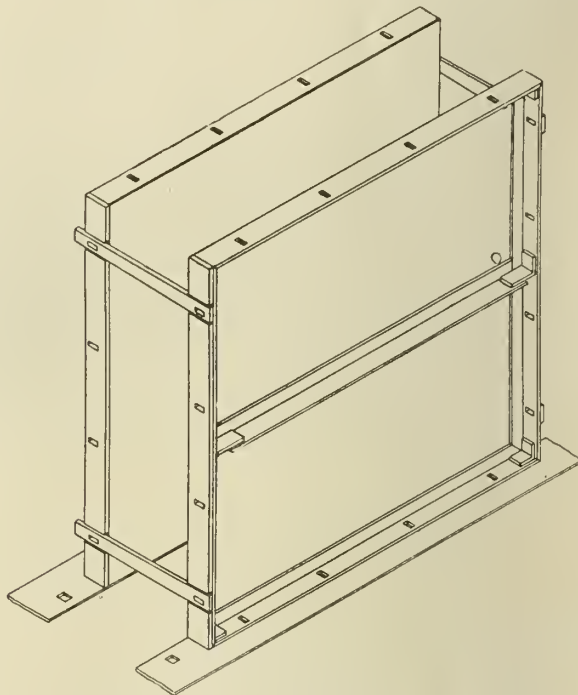
put through the mixers was elevated to the roof, dumped into a hopper and thence to wheelbarrows. When the concrete arrived at the upper roof level, while there was no perceptible heat to it when tried by hand, it steamed both in the hopper and occasionally a little steam could be seen when it was dumped out of the wheelbarrows, and deposited directly into the columns, beams and floor slabs. The wind, according to the weather bureau, was blowing about thirty-six miles per hour, and the temperature was ten above zero. The columns forming the platform for the roof were surrounded with canvas which came out about 2' beyond them. The concrete was prevented from freezing by the aid of eight coke salamanders on the roof level. Snow and ice was removed from the forms generally by the use of a steam jet.

New Metal Forms for Wall, Column and Girder Construction

Every new system of form construction is looked upon with a great deal of interest because in this particular, building with concrete probably will undergo the greatest change in order to erect structures of this material more economically. Any system of forms which reduces the cost of labor in erecting them, and which admits of the greatest elasticity in meeting the demands of construction, will be investigated by builders who are on the lookout for new things in form construction, perhaps more keenly than for anything else in their business.

The Blaw Steel Centering Co. announces a new equipment of metal forms and the manufacturers say, in putting out their new product, that a system of forms which combines the three processes of form erection—that is, assembling of forms, lining them and spacing them—will bring about a great saving. They believe that their new steel forms do combine these three processes in one. The drawings reproduced here give an idea of the construction of the forms. The panels which make up the wall forms are

based upon a standard sized surface 24" square. Forms are furnished in fractional sizes 25"x12", 24"x6", 12" square and 6" square. These sizes enable the builder to follow his plan in either of two dimensions with a multiple of 6". Corner panels are supplied which are 24" high and each side of the angle 12" long. The panels whether plain or corner are flanged on all four edges. The flanges consist of angles which are spot

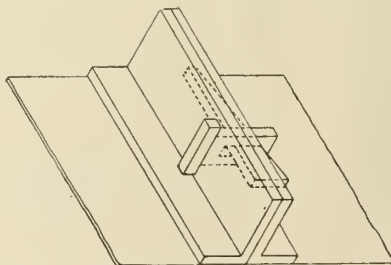
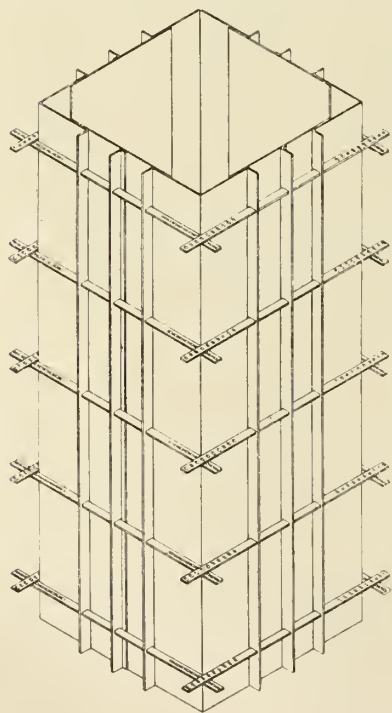


Panels Set Up

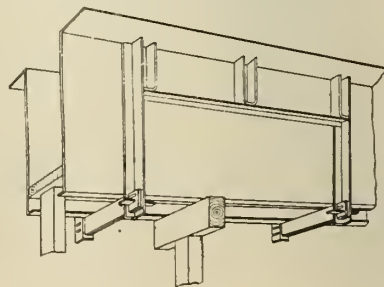
welded to sheet steel plates. The corners of the angles are joined to form a complete edge around the entire plate. There are no holes in the plate and the stiffest construction possible is intended. There are no rivet marks on the faces of the forms. To join these plates, slots are provided in the angles which form the flanges of the panels. These slots are spaced 6" apart and are made to receive a special fastener. Only one type of fastener is used in all pieces connected with this form system. It is designated as a "flat-bolt" and consists of a small stamping of steel plate. This passes through the slots provided in the flanges of the panels and other similar slots in liners and spacers. The fastener itself is made so that a wedge is driven clamping several pieces securely together. An illustration shows the fastener, also a section of panels, liners and spacers assembled. The liners are in lengths of from 4' to 10' so that they extend across several plates.

One of the most interesting features of the new Blaw system is in the method provided for construct-

(Continued on page 78)



Adjustable Column Form;
Special Fastener;
Girder Form



For Securing Wood Forms

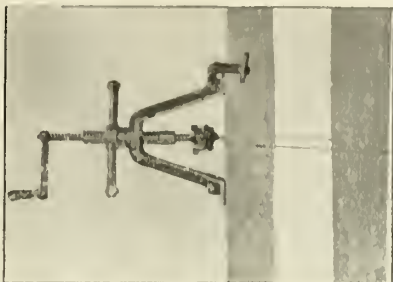
Milwaukee Wire Tightener and Twister.

Why use cumbersome clamps or drive your lumber full of spikes? Hold your forms in place by wire on the outside. Tighten it—fasten it in place—with our Wire Tightener. When concrete is set, cut the wire and your timber is good as new.

This tool will pay for itself on the first job. Ask for circular and prices.

The Milwaukee Device Company

1287 National Ave., Milwaukee, Wis.



The Auxiliary Ratchet Lever: insures more Power, than the ordinary one lever bender. Our BAR BENDER No. 5 is specially valuable in Reinforced Concrete work.. Portable, instantly adjustable to all shapes of stock up to 1½". Send for booklet of all sizes of improved bar, eye, "U" and ring benders.



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Crushed Granite

Graded in several sizes for concrete work. This is the best material for facing artificial stone, monolithic concrete work, stucco, floors, sidewalks, etc.

Concrete made with this material is strong, dense, moisture-repelling and has the appearance of natural granite, molded to any form. Send for complete information and sample.

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VISIBLE CONCRETE MIXER



By hand, one man can turn out 4 to 5 cubic yds. well mixed material per hr. 1 1/2 H. P. engine doubles the capacity. Hoppers 46 in. above ground. Material cut and plowed and mixed by two screw conveyors on a revolving disc. Used by municipalities and construction companies everywhere.

OTHER KELLER MACHINES

Batch mixers, block machines, cap and sill molds, brick machines, fence post molds, porch molds, etc. Tell us what you need. Our prices will surprise you.

KELLER CONCRETE MACHINERY CO.

Kearney Neb.



Drawing of the Residence on Bitter Root Stock Farm, Hamilton, Montana. Owner, Mrs. Marcus Daly.

THIS notably fine and pure example of modern colonial architecture is the residence on Mrs. Marcus Daly's Bitter Root Stock Farm, Hamilton, Montana. It is built of brick, with white woodwork. The roof, the dormer windows and the triangular space over the portico are covered with

Asbestos "Century" Shingles

"The Roof that Outlives the Building"

In a building of this kind, architectural fitness is the prime factor in the selection of a roof. Its price is hardly a consideration.

Yet no property owner will ignore the fact that an *Asbestos "Century" Shingle* roof costs no more than any other first-class roofing.

That it needs no repairs and no painting—no upkeep charges—that it is proof against fire—that it never "grows old."

Asbestos "Century" Shingles are the first and only light-weight roofing made of reinforced concrete.!

You can get *Asbestos "Century" Shingles* in shapes to suit any architectural style—in several sizes—and in three colors: Newport Gray (silver gray), Slate (blue black) and Indian Red.

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Keasbey & Mattison Company
FACTORS

Ambler, Pennsylvania

Branch Offices in Principal Cities of the United States

New Metal Forms

(Continued from page 76)

ing concrete columns, beams and girders. The fact that columns in the basement of a building are very large, and that the columns of each floor usually are smaller than those on the floor below, results in a great waste of material when wood is used to build the various sized molds for the columns. The Blaw column forms are adjustable. A part of a column form is shown in the illustration. Adjustable beam and girder molds are also made, using wooden planks for the bottoms. These pieces are so clamped together that the sides may be removed and used in another part of the work, while the bottom board form remains in place, securely shored until the curing of the concrete is completed.

The decision of the United States Circuit Court at Indianapolis, Ind., about a year ago, which refused to sustain the patent issued to Hurry and Seaman on a process of burning pulverized coal in rotary kilns, has been affirmed by the United States Court of Appeals, sitting in Chicago, Ill. It is held that while Hurry and Seaman were without doubt the first to burn cement with pulverized coal successfully in rotary kilns, other engineers in passing from oil to coal for fuel made use, to quote Judge Baker, of the "known prior art coal injectors." The Hurry and Seaman patent, according to the decision of the court, does not cover all forms of burning pulverized coal in rotary kilns, and other engineers using coal injectors and experimenting with other factors in coal feed and air pressure, have developed successful burners.

The people of Swanton, Vt., will erect a new school building of up-to-date construction to replace a building which has been condemned by the Board of Health. A two-story brick building is being talked of to cost from \$30,000 to \$35,000, and R. L. Currie, Swanton, writes CONCRETE that he is anxious to see his town put up a building of concrete which will be fireproof and modern in every respect. The building will have to accommodate 400 students from the kindergarten to the high school inclusive. Mr. Currie writes that the State Board of Health does not favor concrete for school purposes, so here appears to be an opportunity for some missionary work. CONCRETE knows very well that concrete school buildings are the best school buildings to be built. Any one who would like to go after this job will find Mr. Currie willing to supply necessary information.

E. S. Wheeler, Assistant Commissioner of the Department of the Interior of the Government of Porto Rico, writes CONCRETE that his department is desirous of obtaining catalogs, price lists, etc., of contracting machinery, tools, building materials, supplies and so forth, for files and references for its divisions of Buildings, Public Works, Irrigation, etc.

A subscriber writes CONCRETE: We require information concerning experience and practice in the con-

struction of reinforced concrete tubes for water power development. We are considering concrete for the construction of a 12' tube to carry water under a 30' head, and would very much like to get in touch with someone who has had some experience with this line of work. Can you put us in touch with any engineer who has designed or carried out such work in concrete? Will engineers familiar with this subject please address H., Newfoundland, care of CONCRETE.

Books Received

Construction of Dwelling Houses and Bungalows. By U. M. Dustman. Pages 214. Size 6 by 9. Price, cloth, \$1.00. The Chas. C. Thompson Co., Chicago, Ill.

In this book the author shows the plan and elevation drawings for many medium priced houses, and with each plan he presents a bill of material so that it is possible to take this bill of material to a material man and approximate very closely the cost of a house. He also gives tables showing lengths and sizes of rafters, other tables showing the number of brick required for walls of various thicknesses, the number of nails required in various kinds of work, details of interior finish, including sideboards, kitchen cabinets, fireplaces, staircases and so on.

* * *

Economics of Contracting. By Daniel J. Hauer. Pages 269. Size 5¾ by 8¾. Price, cloth, \$2.50. E. H. Baumgartner, Chicago, Ill.

The author addresses this book to contractors and in the various chapters discusses the business end of contracting. He describes and discusses various forms of contracts, proposals, bonds, relation of contractor to architects and engineers, office work and overhead expense, relation of the contractor to his employees, construction camps, machinery and equipment, and many other matters which should be of interest to builders who are anxious to improve their methods and follow best practice.

* * *

Reinforced Concrete Construction. By Henry Adams and Ernest R. Matthews. Pages 311. Illustrated. Size 6¼ by 9. Cloth bound. Longmans, Green & Co., New York City.

This book combines in its scope both theory and practice in construction with concrete and in such a way that the work undoubtedly will prove valuable to many engineers in solving problems which they are meeting every day in designing work in concrete.

* * *

Concreting in Winter is the title of a pamphlet issued by the Aberthaw Construction Co., Boston, Mass. The text relates the experiences of the company in cold weather work and this experience covers a period of eighteen years. The booklet is illustrated and should be full of suggestion to the contractor.

* * *

Concrete Tile Men Meet

Looking to the upbuilding of the growing industry which its members represent, the Interstate Cement Tile Manufacturers' Association held a three-day convention at the New Southern Hotel, Chicago, Ill., at the time of the Chicago Cement Show. Some of the papers will later be published in CONCRETE. P. H. Atwood, Armstrong, Ia., who was re-elected president of the organization, mentioned three matters in tile manufacture deserving of special consideration. First he named, producing a better tile; second, the development of a cost system in each individual business, and third, the adoption of side lines which may be carried on successfully by tile manufacturers to increase profits. Besides Mr. Atwood, other officers elected are: D. G. Keith, Ceylon, Minn., vice-president; Howard H. Twogood, Boone, Ia., secretary-treasurer.

Stop That Leak

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"Anti-Hydro"

"Anti-Hydro" is the only positive and permanent water-proofing material in the market. It is a liquid which makes cement water, dust and acid proof. It will overcome the most difficult waterproof engineering problems, and has never failed to produce an absolutely tight surface. Because of its acid-proof qualities, it is especially adapted for use on floors in laboratories, factories, etc., where acids are freely handled.

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WILL OUTLAST YOUR BUILDING

Artistic and Ornamental in appearance and is positively guaranteed to be Fire, Lightning, Rain, Storm and Wind proof.

Its extreme lightness (about one-eighth that of slate), durability and moderate cost commend it to those wishing something out of the ordinary in roofing.

Manufactured from best quality Worcester Grade Terne Plate, furnished painted or galvanized (galvanized after formation) size 10 x 14 inches.

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The World's Largest Manufacturers of Metal Roofing, Metal Shingles, Metal Ceilings, Etc.

Send for New Free Roofing Book showing our complete line of Metal Roofing, Siding, etc.

CRUSHED WHITE STONE AND MARBLEDUST

USED IN YOUR WORK

Adds Little to Cost --- Increases the Profits

Livens up Cement Work, Improves Appearance of concrete blocks, bricks and all concrete products; adds to looks of stucco and is unsurpassed for brilliant Floor Finishes; Unexcelled for white plastering and exterior plastering.

We are prepared to furnish **prompt shipment** and **perfectly crushed materials** at a short notice.

Send for sample of our material and let us quote you prices.

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TUCKAHOE,
N. Y.

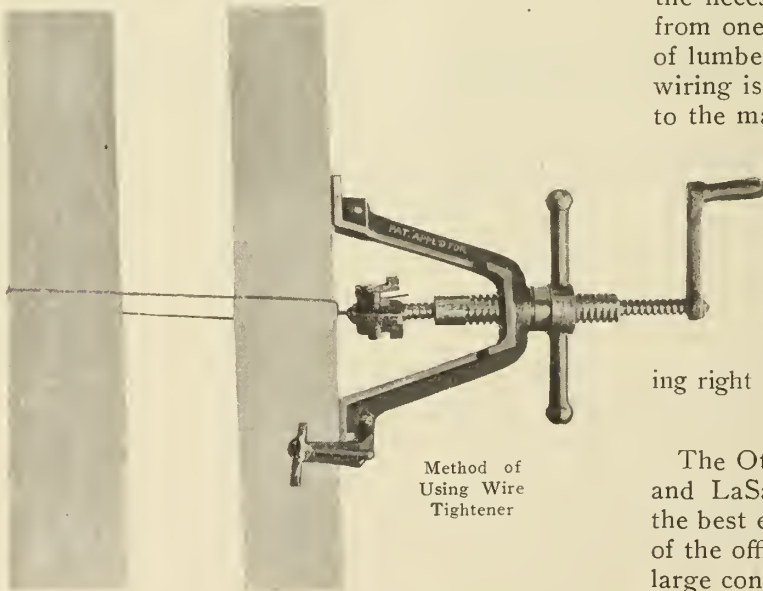
New Equipment, Methods and Materials

In this department the Editors endeavor to keep our subscribers informed upon new tools, methods, machines and materials used in this industry. It is in no sense a department for the benefit of advertisers. To secure attention the thing described must be new to our readers. No matter will be printed simply because an advertiser desires it. Likewise, no matter will be excluded simply because the article described is not advertised in this paper. We aim to keep our readers informed—suggestions for the improvement of this department are solicited.

"Monorail" Wheelbarrows for Contractors

Wheelbarrows fitted with a flanged wheel, designed to run on either rail of a railroad track, are manufactured by the American Trackbarrow, Lowell, Mass. They have been ingeniously designed to enable the workman to take advantage of the smooth roadway provided by the steel surface of the rail, while he walks beside the tracks. The broad wheel is set at a slight angle with the barrow, so that in using, the left handle of the barrow is practically parallel with the rail on which the barrow is supported.

Features of the trackbarrow that are immediately suggested are the ease with which it can be pushed, owing to the good going, made possible by the rail; the fact that the wheel is large enough so that the barrow is almost self-balancing; that the rail therefore carries practically all the load; and that the center of gravity is kept low, making the matter of dumping to either side as desired a very simple matter.



Method of
Using Wire
Tightener

"The man behind" may walk on either side of either rail and at the approach of a train dump his load and remove the barrow from the rail without dangerous delay. The standard type of trackbarrow is made with a hardwood frame, steel braced and bolted throughout. The tray is of one piece of sheet steel, of uniform thickness, the edge flanged over a 5/16" rod. The tray is 28" long and 31" wide and the outfit weighs 60 lbs. The wheel is of rolled steel, with flanges to fit standard rails up to 85 lbs. A. S. C. E.

Wiring Wood Forms

Concrete contractors who have encountered the old problem of how to use wood forms with the least loss of time, labor and lumber, will be interested in the invention of a Milwaukee man, the purpose of which is to facilitate the assembling and fixing of wood centering by use of common wire.

We illustrate here the device as operated. The inventor points out that the use of this tool obviates the necessity of transporting form-holding devices from one job to another and makes the defacement of lumber by spiking entirely unnecessary. All the wiring is done outside the forms, which will appeal to the man who has tried to wire column or girder forms in place by manipulating a pair of 12" pliers in a 13" form. Forms are released by simply cutting the restraining wires. The Milwaukee Device Co., 1287 National Ave., Milwaukee, Wis., manufactures this tool, which is designed solely for the purpose of twisting the wire, thus tightening it and fixing the wood centering right where it should be.

The Otis building, now being erected at Madison and LaSalle streets, Chicago, Ill., will be one of the best equipped office buildings in the city. Most of the office room in the building is being leased by large construction companies.

SAMSON SPOT SASH CORD

Made of extra quality stock, carefully inspected, and guaranteed free from all imperfections of braid or finish. Proved by both tests and long experience to outwear common cord or metallic devices many times over. Can be distinguished at a glance by our trademark, the Spots on the Cord. Send for catalogue and samples.



Trade Mark Reg. U. S. Pat. Off.

Samson Cordage Works, Boston, Mass.



Dollars in Every Page for You

The New Catalog of the Ideal Concrete Machinery Company is a mine of information upon the subjects of concrete manufacture and construction.

It tells what to do and what not to do; what machinery to buy for a modest start, and how to enlarge as occasion demands.

It gives fullest instructions regarding the making and selling of concrete blocks and bricks.

We don't want this book to fall in the hands of irresponsible people, but to men who are actually interested in concrete possibilities we actually pay a dollar each for the privilege of sending them this book.

We charge one dollar for the catalog merely to keep it out of the hands of undesirable parties who would simply send for it out of curiosity. But the man who really wants the best advice on concrete machinery here has a safe guide and we

credit him with **two dollars** on his first order of ten dollars (**net**) or over.

You can start with a single Ideal Block Machine and add to your equipment by individual Ideal units such as Tamper, Scraper and Finisher, Core Actuator, Conveyor and Feeder until you have a large establishment that has been paid for out of your profits.

No other business offers the same possibilities as does the making of concrete blocks and concrete ornamental specialties, and no other machinery for their manufacture approximates the efficiency of Ideal Concrete Machinery.

Be first in your locality to make good concrete blocks, the kind that has the durability of stone.

Send the coupon today for the book. It is more than a catalog, it is an encyclopedia of concrete lore.

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London, Ontario, Canada.
Chicago Office—1075 Old Colony Building.
New York Office—1958 Hudson Terminal Building.

Architects are referred to
Sweet's Index, pages 28
and 29.

Please send me your 160 page book, Ideal Concrete Machinery, for which I enclose One Dollar, it being distinctly understood that with my first order of any goods of your manufacture, amounting to ten dollars (net) or over, you are to allow me a special credit of two dollars.

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Address

City State

Portable Acetylene Gas Plants and Lamps

Acetylene gas, made by the action of water on calcium carbide, is one of the best known illuminants of modern times. Its widespread use in automobile driving lamps and trolley car headlights makes the general public familiar with its tremendous efficiency in lighting. Its adaptability to the work of the contractor who is called upon to do night work is a more modern development, but this work has been carried to a high degree of perfection. The Alexander Milburn Co., 505-507 W. Lombard St., Baltimore, Md., are inventors and manufacturers of a number of ingenious machines for making acetylene lighting available in industrial work. The firm makes, besides house generators for residence lighting, locomotive headlights, systems for illuminating trains, dredge lights, steam shovel lights and search lights. The latter are adapted for lighting big construction jobs, tunnels, mines, quarries and so on.

Essentially, the Milburn type of lamps comprises three parts—an outer tank for water, an inner receptacle to contain the carbide and a burner stand pipe. Water is introduced into the carbide receptacle and gas is immediately generated. This is led to the burner, where it is mixed with air and lighted. At the base of the light outfit is a washer, into which both the inlet and the outlet pipes are fitted, with the result that the gas is washed and cooled before it reaches the burner. This prevents "back-firing." Any condensation formed collects in the washer, which is so arranged that it can be drained from time to time as required.

For long-time burning, the company supplies lights equipped with extra trays half-filled with carbide and ready for insertion in the generating tank. When the light is exhausted, a fresh supply of carbide is put in and the lamp resumes its work.

Acetylene gas flames are not affected by currents of air and the chemical used to generate the gas costs from $3\frac{1}{2}$ to $3\frac{3}{4}$ cents per lb. It is obtainable in practically any city. The generating apparatus is extremely light; for example, a light that will generate from 5,000 to 12,000 candle power over a wide area weighs only a trifle over 100 lbs.

Adjustable Mold for Concrete Tile

William Cobb, a well known foundryman at Jackson, Mich., whose concrete block machine was recently described in these columns, has increased his interest in the concrete industry by taking over the manufacture and sale of an adjustable mold for turning out concrete tile from the smallest sizes to 8" in diameter and 12" in length. A number of these molds have been sold within the last twelve months and Mr. Cobb reports that they are giving excellent satisfaction.

A full line of municipal castings, such as man-hole covers for sewers, valve boxes and "Hall" inlets, is made in the Cobb foundry.

Direct Current Motors and Generators

Modern business management concerns itself very vitally with keeping down the depreciation, the "wear and tear." In a great number of industrial operations, where for one reason or another it is not desirable to keep all the machinery in the plant plugging along all through the working day, the installation of individual electric motors for each piece of machinery has solved a vexing problem for the man responsible for keeping down the cost of production. Electric power, thanks to long distance transmission and the prevalence of knowledge of its advantages, is now almost universally available. This has brought the electric motor into every industrial field.

Chief among the advantages of the individual motor are its economy, certainty and efficiency. It is economical because only the power immediately needed has to be utilized; it is certain, because there is little or nothing to get out of order in a well made motor. It is efficient because the electric motor carries temporary overloads without difficulty or damage. In the possible case of an accident to machinery in one part of a plant, that part alone needs to be shut down, where motors are used.

Type "R" motors and generators are manufactured by the Ohio-Sterling Co., Dayton, Ohio, in sizes from 1/16 h.p. to 30 h.p., inclusive. The small sizes run at a speed of 1,800 r.p.m., are built with laminated field frame and the larger sizes with frames of the cast iron type. Where current costs more than 6 cents per K. W., the manufacturers figure that a machine of the laminated type will pay for itself out of the saving in operation as compared with a cast frame machine.

With the rapid advance made in the manufacture of power machinery for use in concrete products plants, the application of electric power is becoming more and more widespread. All classes of mixers are readily adapted to motor power, as are tile machines, elevators, industrial railways and so on. The Ohio-Sterling Co. has made an intelligent study of the needs of the average concrete contractor or plant owner and offers to submit plans for reducing plant cost from the operating standpoint.

We are the sole agents in United States, Canada and Mexico for

Meyers' German Cement and Liquid

FOR PATCHING ALL KINDS OF CEMENT WORK

We have a large stock on hand. Prices as follows:

1 Kilo Can.....	\$1.50
2 Kilo Can.....	2.75
4 Kilo Can.....	5.00
Barrel powder, 50 Kilos, per kilo.....	.80
Demijohn liquid, 68 Kilos, per kilo.....	.80

All prices f. o. b. New York City.

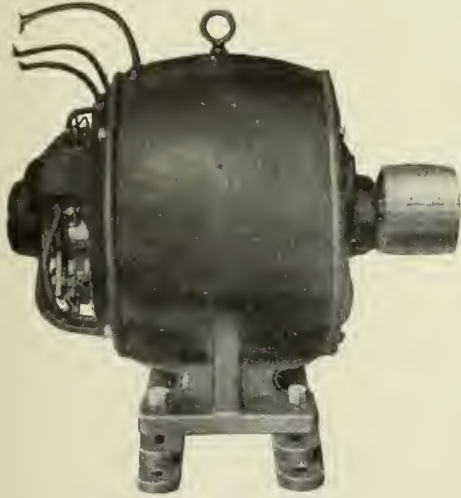
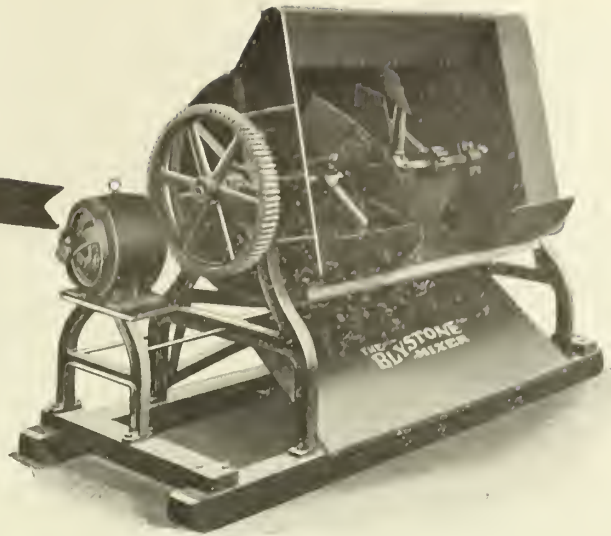
We also handle Dugan's Invisible Patcher for patching all kinds of Limestone and Bluestone. St. James Bldg., Broadway and Twenty-sixth St.,

MICHAEL COHEN & CO.
NEW YORK CITY.

You wouldn't think of running a machine shop without power, would you?

Then why run your concrete plant by hand? Why not add to your profits by using electric power?

Blystone Batch Mixer Operated by a Sterling Motor.



Sterling Motors

don't cough, spit, kick, balk or die

You, Mr. Concrete Man, may be doing outside construction work and your hair may be turning gray because your engine works only **part** of the time. Or you may have a concrete plant without power and your labor cost eats into your profit. Or you may be sitting up nights arguing with a balky engine.

It doesn't pay. Get into the right track now, by attaching a Sterling Electric Motor to your equipment and turning the switch.

No matter what machine you want to run by power, we have a motor built for that machine. The profits in the concrete business today are being made by those men who use electric power to run their machinery. Power driven machinery makes more concrete products, mixes better concrete, handles concrete faster, cheaper and better than any of the old-fashioned methods. Electric power is cheap. An electric motor requires no supervision. You don't need a man to watch it. Turn the juice on in the morning and she'll hum all day, carrying

the load whether it be light or heavy.

You may find it advisable to attach a small motor to one machine and drive direct. Or it may be cheaper to install a larger motor and distribute the power to different machines.

Send us a layout of your equipment. Tell us the horse power you require. Tell us if the electric current you have available is direct or alternating. We'll advise you how to apply the power and what size motor you need. This information will cost you nothing.

The Ohio Sterling Company

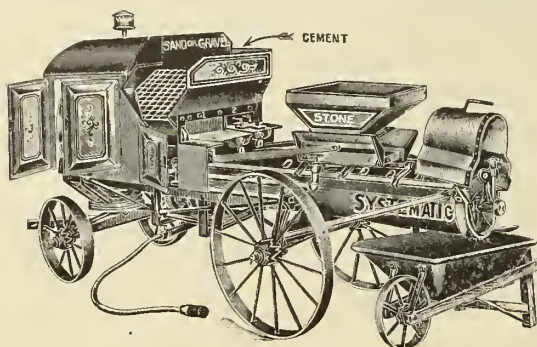
Manufacturers of Electric Motors for Concrete Machinery.

DAYTON, OHIO

A Point About Continuous Mixing

Continuous mixers have been the subject for discussion among many engineers who have definite theories about the methods by which concrete materials should be mixed. Among engineers who look with favor upon mixers of the continuous type (and this number is rapidly increasing) there seems to be a wide difference of opinion as to the order in which the different materials should be introduced in the mixing barrel.

The Cement Machinery Co., Jackson, Mich., used to build the "Systematic" mixer with three hoppers so arranged that cement, sand and gravel would feed into the trough at the same point. This mixer



Meeting One Phase of the Mixing Problem

is still built in this type but the company has given ear to the theories of other engineers and is placing on the market a type on which the stone hopper is located away from the sand and cement hoppers. The sand and cement are thus given a dry mix before any coarse aggregate is introduced. The mixture reaches a position under the stone hopper in the form of a dry mortar. Crushed stone or coarse gravel is then added, with water, and the wet mixing is completed as the mixing shaft conveys the mass on to the discharge end of the trough. The particular style shown in the illustration has a rated capacity of 70 cubic yards per day of ten hours.

Heavy Type Tile Machine

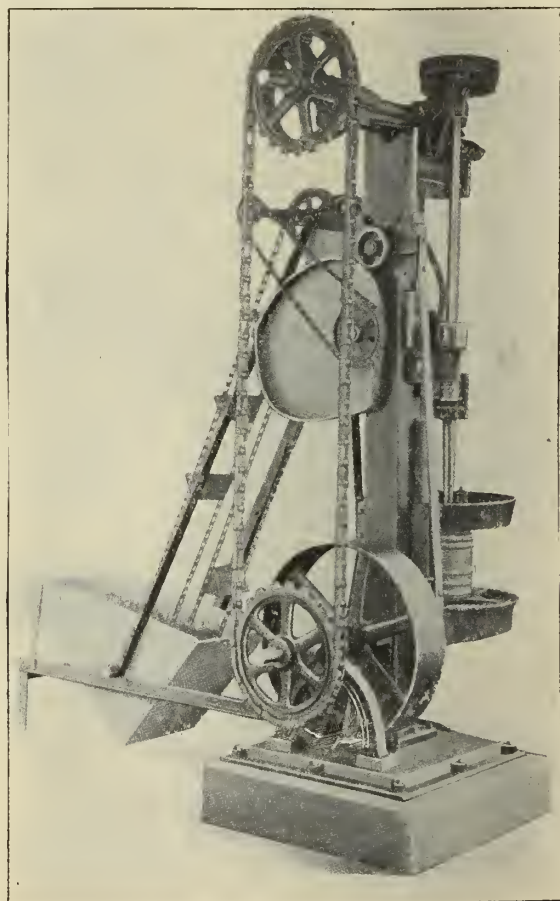
We believe that in no department of the industry has machine design advanced more rapidly than in the drain tile machinery business. Every tile machine counted among the pioneers of seven or eight years ago has been improved step by step as experience has shown that early types were faulty in details. Every new machine that has been placed on the market of late years has had to show advanced lines of design or prove a failure.

We show here the Rosbrugh tile machine, built by the Nappanee Iron Works, Nappanee, Ind. This machine has been in existence for more than a year, but was not put upon the market until it had been given a season of good hard work, making tile.

The illustration does not give a general view of the machine but is illuminating in detail. This back view will give some idea of the sturdy, solid type of

construction. The builder realized the importance of a solid base and a rigid frame in a machine that gets as hard usage as does the average tile machine. Perfect alignment is an important feature in machines of this class.

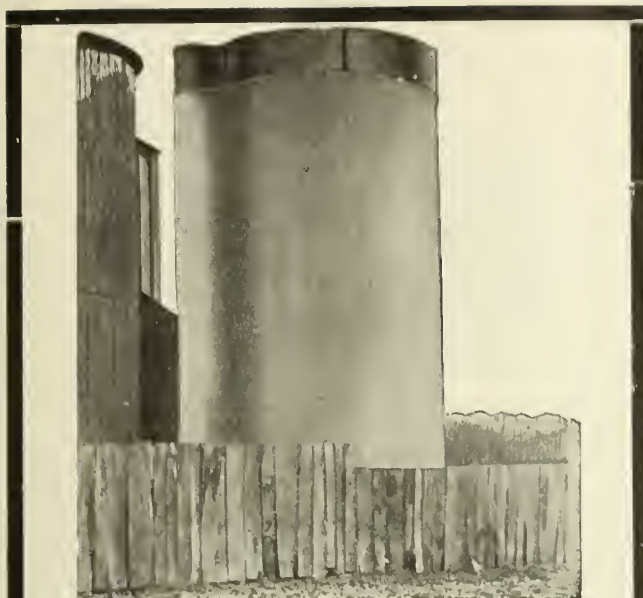
The Rosbrugh works continuously, no stopping and starting being required for removing and replacing jackets. The packerhead remains in one place revolving continuously, while the tables move up and down. The tables rise to a point where the smoother forms a bottom for the jacket; the conveying buckets, being timed, dump the material; the



Rear View of Rosbrugh Tile Machine

tables, after holding long enough to allow the packers to revolve several times, making the bottom end of the tile very hard, move down until the packers are at the top end of the tile where another stop is made long enough to give that portion of the tile an extra packing; then both tables move down far enough to disengage the smoother from the tile where the upper table stops; the lower one drops to a point six inches below, where it remains motionless for a sufficient time to allow the tile to be removed and an empty jacket replaced; the performance then being repeated at the rate of six to eight times per minute, depending upon the plant facilities for handling the tile.

The machine is built in two sizes. No. 1 is equipped to manufacture tile 4" to 12" in diameter, 12¼" long. No. 2 will make tile 4" to 18" in diameter, 12" or 18" long.



Silo, 14 by 40 ft., erected at Reading, Ill., by Contractor O. G. Armstrong. Upper Half of Mould Left in Position Preparatory to Building Water Tank on Top of Silo.

Monsco Silo Moulds

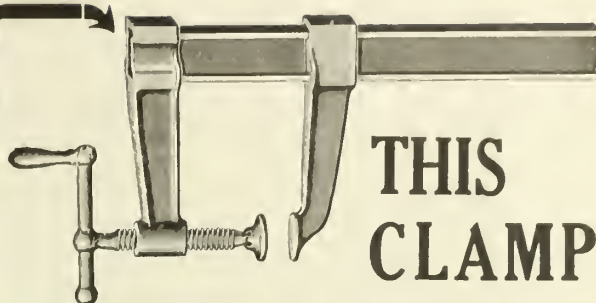
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CHEAPEST AND BEST.

Made as accurately as a watch. Material and workmanship guaranteed. Our copyrighted building instructions enable any concrete worker to erect a standard monolithic reinforced silo. Write for our free booklet of 50 pages.

Monolithic Silo & Construction Co.

852-4-6 Peoples Gas Bldg.
Chicago, Ill.



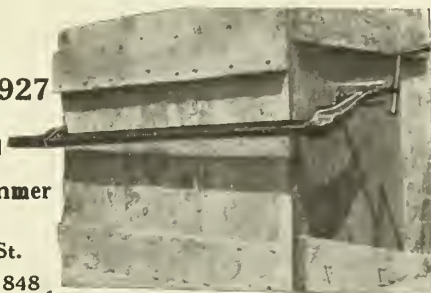
THIS CLAMP

is the handiest, cheapest, most satisfactory device for holding concrete centering in place. It is instantly adjusted, holds the forms rigidly and is easily released. A turn of the screw arm does it. These clamps are just as handy in manipulating wood molds in your shop as they are on the construction job. They are far better than nails or wires.

All Kinds of Clamps

We handle all kinds of wood and metal clamps for concrete contractors, carpenters, cabinet makers, etc. Our catalog illustrates all styles. It is an interesting booklet to have. A copy will be sent free on request.

Ask for
Catalog
No. 2927



Hammacher, Schlemmer
& Co.

4th Ave. & 13th St.
New York, Since 1848.



The Peerless Concrete Silo and Equipment

is the most simple, yet practical and complete ever offered for use or sale.

Contractors can give silo owners the best and most complete silo on the market and at the same time make larger profits than by any other system; either single or double wall construction. Standard sizes are for diameters of 12', 14', 16', etc., but others, also a FLEXIBLE mould by which one mould will build all diameters, may be had.

We also manufacture molds, single or double wall, for building other buildings, barns, houses, etc. If you are in the market for anything in our line, either building equipment or buildings constructed for your own use, write us for particulars before making any other arrangement. Full particulars and prices given upon request.

We are the sole owners of United States Letters Patent Numbers 759031, 839667, 839668, 953720, and patent pending Serial No. 667,345, covering our molds with their latest improvements, and

We caution all persons, firms, or corporations, from manufacturing, selling or using molds infringing on above patents or contributing toward such infringements, as we will take such steps as may be necessary to protect our rights under said patents.

We want agents or organizers in every state.

New Enterprise Concrete Machinery Co.

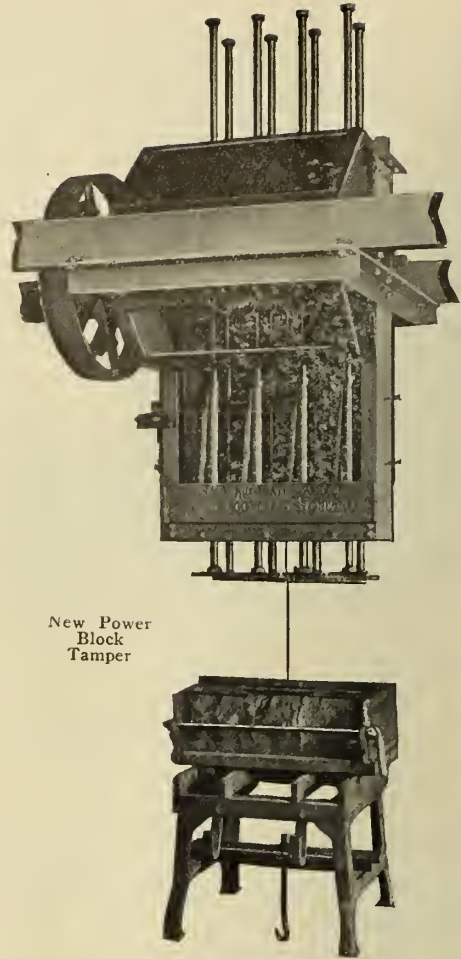
154 W. Randolph St., Chicago, Ill.

New Power Tamper

Reduction of factory cost by increasing output and an improvement of quality of product are two objects which manufacturers of concrete block machinery have long sought to attain. The same applies in general to shop-made concrete products, such as tile, brick, etc.

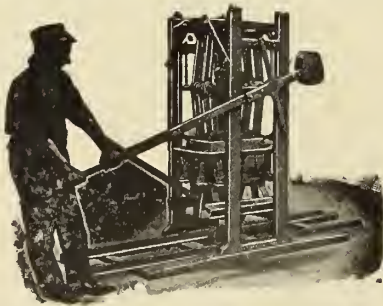
Unquestionably the power tamper has done much to improve quality and reduce unit costs. One of the oldest block machines on the market is that of the Anchor Concrete Stone Co., Rock Rapids, Ia., which makes a building block in two separate parts, connected by wire ties. The manufacturer has now placed on the market a power tamper which may, of course, be used in connection with any make of block machine. The new tamper contains a number of features that are new. For instance, the tamping mechanism requires no floor space, as it is suspended over the block machine from a heavy frame attached to the ceiling. The tamper arms work in a case which protects important parts from dust.

The inventor claims that two men operating this machine can turn out from 400 to 500 block per day. The eight tamping arms are raised by roller crank-arms and each tamper strikes the concrete 75 separate blows of 600 lbs. each per minute. Each tamper drops 18" in striking its blow and when the brake is applied the tampers rise to a level 16" above the mold box, to allow removal of the block. One of the advantages claimed for this tamper is that it is practically noiseless.



New Power
Block
Tamper

Somers Pressure Block Machine



This is a machine that molds concrete blocks under heavy pressure—the concrete is pressed into a block that defies competition. Somers blocks have passed the severest tests successfully.

WET MIXTURE

The only true concrete is made of coarse materials, mixed wet. Get a machine that will handle such a mixture without sticking. We have just issued a book that tells just how such blocks are made. Write us for a copy.

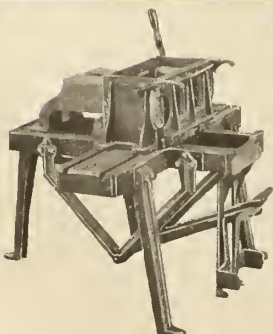
SOMERS BROTHERS

Box A, Urbana, Ill.

STRONG COLORS FOR CEMENT

Red, Black, Buff, Green, Blue, etc.

C. J. OSBORN COMPANY 268 Water St.
New York, U. S. A.



"WORLD BEATER" BLOCK MACHINE

Fast, positive, accurate. Mold box and cores controlled by foot levers. Makes solid or hollow blocks, water-table, column, silo and porch blocks. Pallets cast with handles—no carriers needed. Write for new catalog.

U. S. GAS MACHINE CO., Muskegon, Mich.



*It is better to use the
Best—that's*

SAYLOR'S

ESTABLISHED 1866

Portland Cement

The oldest American Portland Cement. Used largely by the U. S. Army and Navy Corps of Engineers for locks, dams, walks, buildings, etc. Quality and color uniform.

Coplay Cement Manufacturing Co.
COPLAY, PA.

Sales Offices:

{ Land Title Bldg., Philadelphia
{ Fifth Ave. Bldg., New York.



"NEW CASTLE"

THE BEST

PORTLAND CEMENT
BY ACTUAL TESTS
FOR ALL PURPOSES
THAT CAN BE MADE

ASK ANY CUSTOMER

THE STANDARD BY WHICH ALL OTHER MAKES ARE MEASURED



ATLAS
PORTLAND
CEMENT
MAKES THE BEST CONCRETE



The cement used exclusively by the United States government for the six enormous double locks and Gatun Dam on the Panama Canal.

NON-STAINING

ATLAS-WHITE

is a true Portland Cement, pure white and non-staining.

If your dealer cannot supply you with Atlas, or Atlas-White, write to

The ATLAS Portland CEMENT Co.

30 BROAD ST., NEW YORK

Morris Bldg., Phila., Pa. Corn Exch. Bank Bldg., Chicago, Ill.



Largest productive capacity of any cement company in the world—over 50,000 bbls. per day



"CONCRETE" is the leading trade journal devoted to the manufacture and use of Portland cement. It interests the largest number of the right kind of readers and is, therefore, the most valuable to its advertisers.

Concrete Publishing Co.
Detroit, Michigan



Where Concrete
is Best for the
Work

BURT
is Best for the
Concrete

GUARANTEED TO PASS ALL STANDARD
SPECIFICATIONS

The Burt Portland Cement Co.
Mills and Office, Bellevue, Mich.

The Road to Success is Paved with the Products of the HELM PRESS

That's a pretty strong statement but we are dead willing to prove it—50% of the users of the Helm Press discarded other machines before buying the Helm and thus they turned failure into success. Their experience told in their own words prove the statement made above.

Contractors and builders are practical and particular men—50% of the users of Helm Presses are contractors and builders. If ten men visit our factory, nine of them will buy the Helm Press in preference to any other machine—that's our record. The Helm Press is its own best salesman. It sells strictly on its own merit. To see the machine, its simple and rapid operation and its product means to buy.

Every conceivable makeshift to gain speed is being adapted to tamping outfits in order to stay in the race with HELM CAPACITY AND QUALITY, but the Helm Press is still undisturbed in its leadership. There is only one way to get Helm capacity and quality and that is to use the Helm Press. Tie yourself to the leader and you guarantee you own success in the concrete business.

Helm Presses are covered by strong basic patents on principles absolutely necessary to rapid production of good concrete products. Look at these features:—

80,000 Pounds Pressure

Terrific pressure makes perfect brick and blocks with strong and sharp corners and edges. The Helm Press gives this enormous pressure every time with less effort of the operator than in tamping.

Wet Mix

Experts agree that medium wet concrete makes the hardest brick and blocks. The Helm Press handles this mixture where other machines fail—Even easier than others work dry material.

Wonderful Speed

The Helm has turned out 1,500 brick an hour. Will easily make 1,000 blocks or 10,000 brick daily. With power the capacity is increased one-half, making 1,500 blocks or 15,000 brick daily.

Here is a glimpse at high grade plant arrangement. This machine is a complete plant in itself.

(Station No. 1)

At this point the mixed materials are passed into the conveyors which move along the track and into the Helm Press. One man at this point furnishes the material for 10,000 to 15,000 brick. This is one step in the continuous operation of the Helm Press.

The Filled Conveyor Box

The man at Station No. 2 places the conveyor box in the machine, handles the front lever which transfers the materials to the cell. He also assists on the pressure lever.

(Station No. 2)

The Pressure Lever

One downward movement of this lever exerts the 80,000 pounds pressure on the product in the machine. The man at station 3 does this and off-bears the product on pallets to car or truck. This forms the complete circuit for 10,000 to 15,000 brick a day. At 20c an hour the cost from mixer to car ready for curing will be 60c per thousand **PRESSED BRICK** or 60c per hundred blocks.

(Station No. 3.)

The power equipment completes the operation in five seconds and increases the output one-half with the same labor.

Just notice how complete the circuit is. This man puts through 10,000 to 15,000 brick a day.

Buy the Helm Press and YOU Get a PRACTICAL, DRY WALL BUILDING System—a Satisfactory Product—a Reliable Machine and the Helm Service

Let us show you how easy it is to get a Helm Press. Merely sign and send the coupon, indicating the equipment you would like to know about.

Queen City Brick Machine Co.,
443 State Bank Bldg., Traverse City, Mich.
Please send Literature on the Lines Checked.

Helm Brick Press
10,000 Capacity.

Helm Block Press.

One Man Brick Press
5,000 Capacity.

Power Brick Press.
Power Block Press

Combination Brick
and Block Press.

Mixers.

"Nearly two years ago we purchased one of your No. 5 presses and we are pleased to inform you that in our opinion it fulfils every claim you have ever published for it. Undoubtedly it is the best block or brick machine on the market. Our products from it have been pronounced by traveling representatives of cement companies to be the best produced in the Northwest—and we were not using their cement either.

In this connection it is our pleasure to thank you for the uniform courtesy and consideration shown by your company in all of our dealings with you. As one instance, when our machinery was shipped to us, shipment was divided, double freight collected from us (under protest) and when it seemed we would not secure adjustment your vigorous action in our behalf located the responsible party and caused immediate refund. Also in other matters you have shown consideration for our welfare, and we appreciate it."

(Name and address on request)

Read this letter
recommending

The Press

The Product

The Service

Name

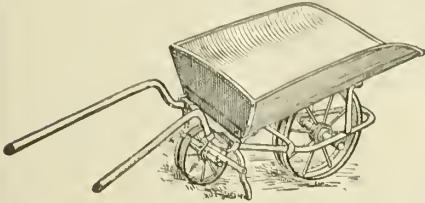
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Men—Money—Muscle—Saved. In Building Cement or Concrete Railway Piers, Abutments, Bridges or Culverts by Using.

He walks beside the rail. Beside either rail. Inside or outside the rail. The rail carries all the load. Dumps over wheel.



ries all the load. Cars are not tipped longitudinally, but run even on the rail, no slopping.

A BARROWCAR string team can work with safety, they enable men to avoid oncoming trains, because they can be dumped and jumped off track INSTANTLY, no danger to men or loss of time.

Also other valuable one rail cars.

For booklet, circulars and prices write the

American Trackbarrow

Cement Department.

Lowell, Mass.

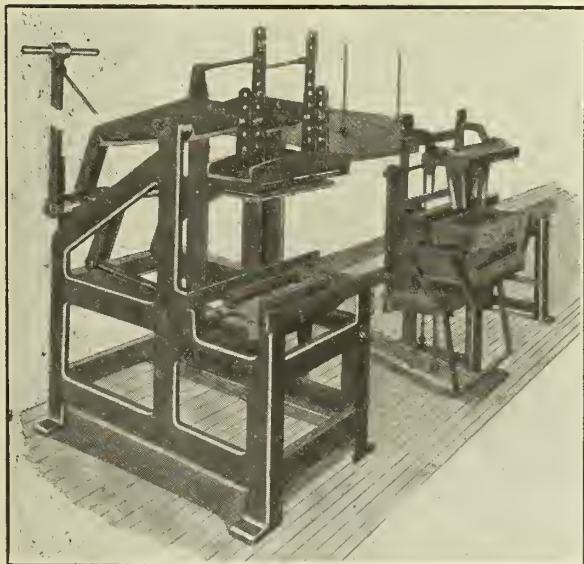
Ask for Booklet J.

THE BARROWCAR, No. 9.

Sold by the AMERICAN TRACKBARROW
Lowell, Massachusetts.

The BARROWCAR is all steel. Capacity 4 cubic feet.

The BARROWCAR enables men to carry loads from batchmixer to job, runs on either rail, rail car-



In the above cut of our

Practical Double Acting Press and Mounted Molds

for the manufacture of Concrete Block and Brick, the Press is shown open, and the Mold Box turned on the tipping table and Box open for removal of product. This machine will make Block and Brick at same time, without interference, and is a guaranteed COST REDUCER, that will enable you to meet any kind of competition.

Owing to our inability to buy a satisfactory machine of this class some three years since, we concluded to build one to suit us, rather than to buy a makeshift.

After a tryout covering two years this machine has made good beyond our expectations.

Capacity from 200 to 2,000 Block, or Brick in proportion, and will fit in any size plant.

Inquiries solicited.

Practical Pressed Stone Co., Terre Haute, Ind.

Eclipse Face-Down Concrete Block Machine

Is adjustable; will make stone 4, 6, 8, 10, 12, 14 or 16 inches long; 2, 4, 6, 8, 10, or 12 inches thick. All these plates furnished with the machine and all can be made on one set of pallets; either iron or wood pallets may be used. Stone 20 and 24 inches long may be made on the machine by buying face plates of those lengths.



The No. 2 Eclipse Machine, not as complete, sold at a very attractive price.

Our machines are mechanically perfect and have the exclusive right to use the stationary ends, which enable the operator with the same effort, to make 20% more stone than could be made if the ends had to be opened up to remove the stone and closed up again to make another.

They will make you a satisfied customer and are sold to you under a positive guarantee. Ask for catalog No. 19a.

George C. Christopher & Son

Wichita, Kans.

Plant on Tisco from Ohio to Indiana Ave. Office, 803 Schweiter Building

Flint Aggregates for Concrete

Visitors at the Kansas City Cement Show will see much concrete work in southwestern Missouri in which a comparatively new aggregate was used. For years the crusher waste from the lead and zinc mines of the district has been piled on leased land for the simple reason that no good use had been found for the material. Now it is being used extensively in concrete work and competent authorities give the material their unreserved endorsement.

In the production of zinc and lead, great boulders are crushed and the crushed material is run through washers which separate the mineral from the rock. The rock is thus a by-product, ranging from $\frac{1}{2}$ " or

$\frac{1}{4}$ " down to fine sand. Robert W. Hunt & Co., engineers, recently tested specimens of this rock and report:

"This chemical analysis shows a flint, unquestionably of greater strength and compression than any lime rock with which we are familiar, and as such, insures greater strength as a component of the aggregate than a mortar can probably ever develop.

"This is valuable, inasmuch as many failures in compression are due to failure of the rock rather than the cement mortar.

"The sizing of the material is well adapted to the proper filling of the voids of the relatively larger sizes of the aggregate, and should show as dense a concrete as could be obtained by very careful grading of sand, gravel and stone."

The Webb-City-Joplin Concrete Supply Co., Webb City, Mo., is marketing this product in territory within 200 miles of the mines. The company controls the output of several mines and at one station has a pile containing 4,000,000 yards. At this point the store is being added to at the rate of 3,500 tons per day. Cars are loaded direct from the flume.

Kansas City alone used 2,800 cars of this aggregate for concrete work last year. It is stated that hundreds of cars have been contracted for by the builders of the new union station in Kansas City. Engineers and contractors who have used the material report that it is ideal for concrete work because it is sharp, angular, hard, clean and well graded. The material will be on exhibition at the Kansas City show.

"Eclipse" Continuous Mixer

In Wichita, Kans., is made a continuous concrete mixer which has been on the market for several years but has never been described in these columns. Geo. C. Christopher & Son, 803 Schweiter Bldg., Wichita, are the manufacturers.

We reproduce here a photograph of the standard type of "Eclipse" continuous mixer, showing the relative positions of cement, sand and stone hoppers and water tank. The builders of this machine have endeavored to guard against every possibility



"Eclipse" Continuous Mixer

of error in the operation of the mixer. The cement is fed by a force-feed conveyor from the hopper to the trough. A larger screw of similar design forces the sand into the trough. These screws are adjustable for different proportions. The stone is fed from the stone hopper by a revolving bucket which takes from the hopper a definite amount of stone at each revolution.

Realizing that mixing machines are often operated by common labor, the builders have provided a friction clutch which will carry the full load of the machine but in case any of the parts get caught or any object is fed into the machine which doesn't belong there, this clutch will slip until such time as the jaw clutch, which starts and stops all the working parts, can be thrown out. This seems to us to be a wise precaution. Unskilled labor, though it has no place near a concrete mixer, unfortunately has to be reckoned with.

Water is admitted to the trough through a spray between the water tank and the stone hopper. It will be noted that the materials have room in the trough to be given a thorough dry mix before the water converts the sand and cement into mortar. The mixture is cut and plowed by concave blades mounted on a square shaft and is delivered into the hopper at the end of the trough. The machine is furnished with gasoline, steam and electric power.



BERGER'S Pressed Steel Forms

For Rapid, Economical, Efficient Concrete Sidewalk Construction

Berger's Pressed Steel Forms represent the most modern method of constructing concrete sidewalks. They are light in weight—fully 20% lighter than any other steel form of equal strength—yet of ample stability as shown by their enduring strength under rough handling while being used over and over again. They cost less than any other steel forms on the market.

It will pay you to find out about these labor saving materials. Just drop a postal to the nearest Branch today.

THE BERGER MANUFACTURING CO. CANTON, OHIO

New York Philadelphia Chicago Minneapolis San Francisco Boston Atlanta St. Louis
We also manufacture Rib-Truss, Ferro-Lithic and Multiplex Reinforcing Plates, Radianc Sidewalk Lights, Metal Lumber, Metal Lath, etc.

Let me tell you about the Cement Roofing Tile Proposition

I used to manufacture cement roofing tile in the Old Country, where cement roofs are common. Twenty years ago I started work on a roofing tile machine. The machine I offer now will make money for any man.

Roofing tile made on my machine are 9 in. wide and 15 in. long. Each one locks on the side to the one next to it and locks at the bottom to two tiles in the course below. It takes 150 tile to cover 100 sq. ft. of roof. One man can make from 500 to 600 tile on this machine per day. It will cost \$18.00 to make 1,000 tile, every item considered. Ridge rolls, hips and end tile made on the same machine.

YOUR OPPORTUNITY

You can buy this machine for making strong, dense, artistic, waterproof roofing tile, and establish an independent business. Or you can add it to your block plant and you'll have a profitable side line. The day of the cement roof is here—seize your opportunity to get in early.

L. Hansen & Co.
2036 Penn St.
Kansas City, Missouri

The Roof of a House

From the standpoint of fire, exterior or interior, the roof is the most vulnerable part of a house. Architects and builders are insisting on fireproof roofs. Slate cracks, clay tile is heavy, expensive and will chip, tin rusts—the cement shingle is coming into its own.

Cement roofing tile may be made for \$18.00 a thousand, to cover 670 sq. ft. of roof. Figure out the price of clay tile in your locality and see how much you can get for 1,000 cement tile and still save money for the owner or builder.

Roofing Book Free

Send for a copy of our booklet, full of facts and figures about cement shingles. How to make them, what they cost, what they sell for, how they are laid—the meat of the roofing nut.



In writing Advertisers please mention CONCRETE.

Lee-Hi

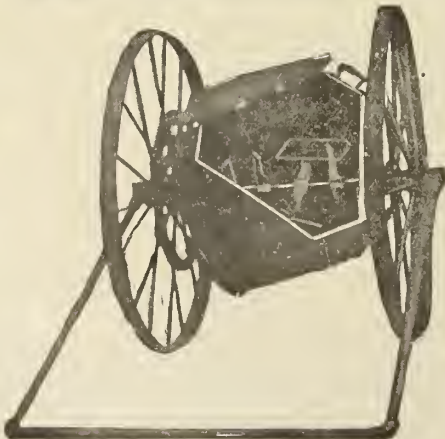
It isn't often that we reproduce in these columns a commercial trade mark, for the simple reason that we don't believe our readers are ordinarily interested in seeing trade marks in the editorial pages of this journal.

But this is different. People have become so used to seeing Portland cement advertised by a round



trade mark, representing the sticker on the end of a cement barrel, that the decision of the Lehigh Portland Cement Co. to use a different design is of general interest. The company wants to inject some human interest into its publicity and the Oriental boy with the bland smile is to be the means.

The announcement that Lee-Hi will hereafter work in conjunction with the old Lehigh brand mark is made in the first issue of a monthly publication edited by S. B. Chittenden, Jr., of the Chicago office of the company. "The Lehigh" will appear regularly and will contain editorial matter of interest to cement users and dealers. The field boasts of many such trade publications now and, while each is primarily designed to help the sales end of some particular company, they all assist in spreading reliable information about concrete construction and that's something that helps every man connected with this industry.



THE ARNOLD CONCRETE MIXER

☞ Materials mixed while you are carting them from the gravel pile to the forms.

THE ARNOLD CONCRETE MIXER is operated by two men—no power is needed—and turns out an excellently mixed concrete in four revolutions, or by moving the Arnold MIXER 50 feet feet. The combination of proper shape and the blades on the interior make possible the complete mixing and depositing of each batch of 2.7 cu. ft. in 3 minutes.

Can be successfully used at low operating cost on road building—as work progresses machine follows. For use in concrete product plants for depositing batches at any point. In new building work or repair work the ARNOLD MIXER can be moved right to the spot of the work.

Write for the details and prices

F. T. ARNOLD

224 William St.,

New London, Conn.

THE PROOF

The Milburn Light Equals Daylight 15,000 C. P.—6c an Hour

**NO
PUMPS**

From
\$22.00
Upwards

**STORM
PROOF**



**NO
VALVES**

Try it
at Our
Expense

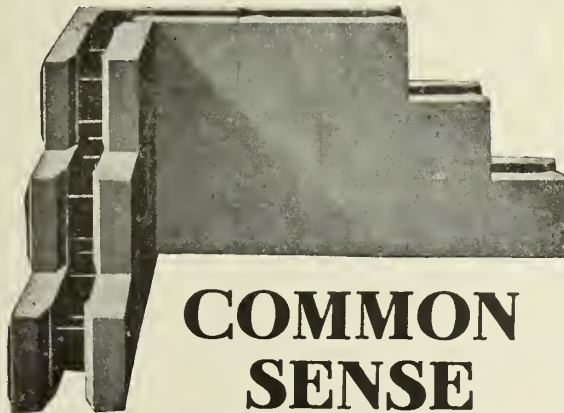
**LIGHTS
INSTANTLY**

Actual Night Scene Using Milburn Light—From an Untouched Photo.

You need one on your overtime or night work.
SEND FOR CATALOGUE.

The Alexander E. Milburn Co.,

505-507 W. Lombard St.
BALTIMORE, MD.



COMMON SENSE

Tell You This Wall is Waterproof

Water can't pass through metal ties. It can pass through any concrete connection between the outer and inner wall of a house.

Blocks made on our block machine make a wall like the one shown. These blocks sell easily. They please architects and owners.

The machine is easily operated. One man can make and rack 150 blocks per day. Get out of the old rut and buy a machine that will put you beyond the reach of competition. Write for our catalog. It'll show you how to get out of the woods—how to make money in this concrete business.

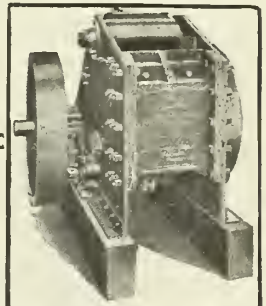
**Cherry Valley
Iron Wks.
Monroe, Wash.**

Agents Wanted

All over the country, to handle this machine. No agent need apply who handles any other block machine.

The Secret of Service
is good materials and
proper construction.

Champion Rock Crusher



The Champion Crusher is a serviceable crusher. It's built of STEEL and made RIGHT.

Why not do your own crushing? Your material will cost you less and you'll have it on hand when you need it.

The Champion Crusher is a good machine, but it's not costly. Made in small as well as large sizes. Mounted on wheels if you want it that way so that it can be easily moved.

Our crusher catalogue will interest you. It won't cost you anything whether you buy a crusher or not. We make screens, elevators, conveyors, rock drills, anything you may need.

The Good Roads Machinery Co.
KENNETT SQUARE, PA.

**Write for
our
catalogue
now.
You should
have it.**

Concrete on the Panama Canal

Much has been written about concrete on the Panama Canal, but we doubt if many of our readers have a clear idea as to the appearance of the entire structure as they might view it from an airship. We reproduce here a photograph of a model of the Gatun locks and dam, exhibited by the Atlas Portland Cement Co. at various cement shows this winter.

The dam shown in the picture will contain about 21,000,000 cubic yards of material. It will be $1\frac{1}{2}$



miles long at its crest and $\frac{1}{2}$ mile at its base. It will be 400' thick at the surface of Gatun lake, which it will form, and 100' thick at its top. The work on

the entire canal job involves the use of five million barrels of Atlas Portland cement. The model photographed was constructed by engineers who make models for the government and all measurements were made to conform accurately to scale.

Somers Block Abroad

Concrete block are making good progress in foreign countries. The Twentieth Century Block & Roofing Co., Victoria, Australia, writes that it has had no trouble in securing the endorsement of architects and engineers for its concrete block work. The company operates a plant in which the block are made wet, under pressure, the equipment having been furnished by Somers Bros., Urbana, Ill. On the Somers press the company has turned out block that have gone into some very important structures in Australia. Architects down there were skeptical about the feasibility of plastering direct to interior block walls. A few demonstrations of the dryness of block walls properly made convinced them and builders all over Australia are impressed by the saving which results from the elimination of furring and lathing.

The Seward Concrete Stone Co., Valdez, Alaska, installed a Somers machine a year ago. Mr. Fager-son, manager of the plant, writes us that with four men he turns out enough block in three days to build a five-room house.

THE MISSING LINK IN SILO AND TANK CONSTRUCTION

PERMANENT As Concrete; CHEAPER Than Wood

EVERY SILO USER AND EVERY SILO MANUFACTURER has been looking for the SILO that will preserve silage as perfectly as the Wooden Stave Silo and will be as durable as the Solid Concrete Silo.

THE PLAYFORD PATENT CEMENT STAVE SILO

has been tested for eight years and has never failed. It has proven to be the

MOST DURABLE and CHEAPEST SILO ON EARTH

Never Cracks *Never Shrinks Nor Swells*
Never Blows Down *Never Burns*
Never Decays

THE FIRST COST IS LESS THAN THE COST OF THE
WOODEN SILO

and

THE FIRST COST IS THE TOTAL COST.

Where the PLAYFORD PATENT CEMENT STAVE SILO has been used in SILO and TANK construction the Farmer will use no other material or method of construction.

Let us prove it to you.

Having secured the exclusive control of the RAMMER-PLAYFORD CEMENT STAVE MACHINE we are offering EVERY CEMENT MAN the opportunity of securing his local trade in SILOS, TANKS, STANDPIPES, CULVERTS, WELL-CURBING, etc.

Write us for full particulars and for terms on our CEMENT STAVE MACHINES.

CEMENT STAVE SILO CO.
DES MOINES, IOWA.

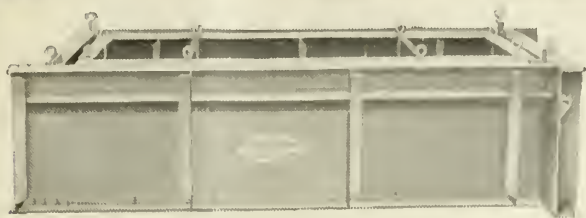


SHERWIN-WILLIAMS

S-W Concrete Finish is economical in application and service. It flows out smoothly and evenly over the surface, sealing the pores and covering a large area to the gallon. This lowers the cost of material and labor. Its splendid wearing qualities insure the greatest durability and satisfactory service. There is no better finish for factory walls, floors and ceilings where its rich, soft colors afford the best light distribution and its smooth, hard surface promotes cleanliness and sanitation. S-W Concrete Finish prevents the absorption of moisture and grease and wears splendidly on floors. Write for free sample folder.

CONCRETE FINISH

The Sherwin-Williams Co., 700 Canal Rd., Cleveland, Ohio.



Adjustable Bessemer Steel Molds.

HERE IS PROOF

of what we have been telling you for a year. Read this letter. We have many more like it.

A Vault Manufacturer of 25 years' experience writes the following letter concerning the **AUTOMATIC SEALING VAULT** and **ADJUSTABLE BESSEMER STEEL MOLDS**:

February 8th, 1912.

The Automatic Sealing Vault Co.,
Peru, Ind.

Dear Sirs:—The Automatic Sealing Vault Molds we bought of you last fall are more than you claim for them. The manner in which they are manufactured is far superior to any we have ever seen. They stay just as they are assembled, nothing to work or get loose, and they make the best vault on the market. We are more than pleased with them. We have been building vaults for 25 years and say there is none so good. We will want some more molds just so soon as we can introduce the vault in the rest of our territory.

Wishing you success, we remain,

Respectfully yours,

W. H. SMALL & SON, Attica, Ind.

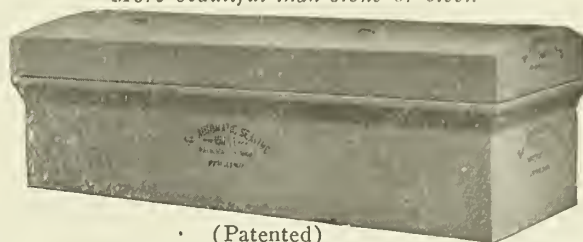
More beautiful than stone or steel.

Here is an opportunity to gain control of the best business that ever presented itself to you.

Write today and get our **BEAUTIFULLY ILLUSTRATED BOOKLET** and get our prices.

The Automatic Sealing Vault Co.

Peru, Ind.



(Patented)

As enduring as the ages.

NOTE:—Try an order of the A. S. V. Waterproofing Solution especially prepared for all kinds of cement products requiring perfect waterproofing. Put up in five gallon cans at \$1.00 per gallon.

Clean Hard Sharp Tough Crushed Flint Mine Screenings

The Cheapest and Best Concrete Material
For all Manner of Concrete Work
The Cement Adheres to Every Particle

ROBERT W. HUNT & CO., ENGINEERS

in report of tests, say:

"The chemical analysis shows a flint, unquestionably of greater strength and compression than any lime rock with which we are familiar, and as such, insures greater strength as a component of the aggregate than a mortar can probably ever develop.

"This is valuable inasmuch as many failures in compression are due to failure of the rock rather than cement mortar.

"The sizing of the material is well adapted to the proper filling of the voids of the relatively larger sizes of the aggregate and should show as dense a concrete as could be obtained from very careful grading of sand, gravel and stone."

Sold by

American Ballast Co.

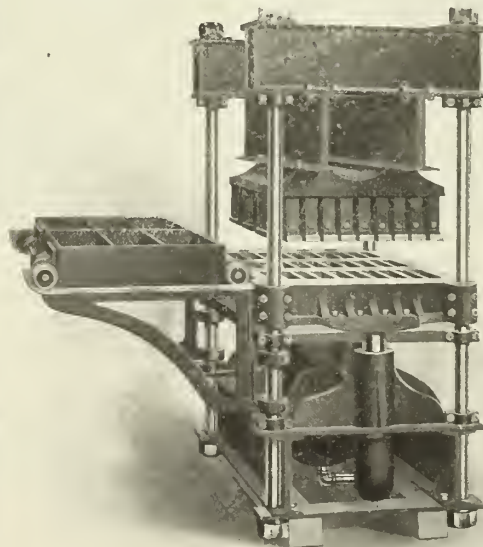
Independent Gravel Co.

Webb City-Joplin Ballast Co.

Webb City-Joplin Concrete Supply Co.

WEBB CITY, MO.

Buckeye Hydraulic CEMENT BRICK MACHINE

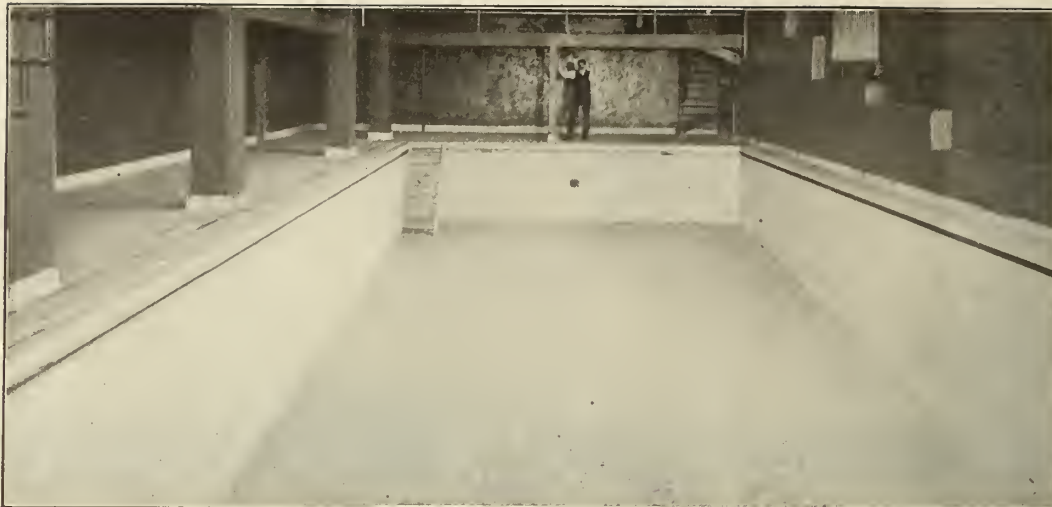


The only successful power press on the market.
Makes 15,000 brick per day, under pressure of 200,000 pounds. We instal complete plants.
We also manufacture Mortar Mixers, Concrete Mixers and Gasoline Engines.

Write us for prices and particulars.

Buckeye Engine & Foundry Company

Joliet, Ill.



Soho Baths, Pittsburgh, Pa. All Walls and Pool Waterproofed with Trus-Con Waterproofing Paste.

WONDERFUL RESULTS WITH TRUS-CON WATERPROOFING PASTE

In Waterproofing only ACTUAL RESULTS COUNT! Read what D. P. Marshall, Supt. of Soho Public Baths, Pittsburgh, Pa., has to say about TRUS-CON WATERPROOFING PASTE:

"Regarding the waterproofing of the Soho Baths with your Trus-Con Waterproofing Paste, will say that same is perfectly satisfactory.

"Our conditions were rather extreme; the building is situated on Fifth Avenue, 3 stories above and 3 stories below Fifth Avenue. Our front wall extends down 36 feet below the street, being 12½ feet thick at bottom, composed of concrete.

"The water backed up against the wall from springs in the hill and came through a dozen different places, running con-

The use of Trus-Con Paste is very simple; merely dissolve it in the water used in mixing the concrete, and secure the most positive and permanent waterproofing.

"SCIENCE AND PRACTICE COMBINED IN WATERPROOFING," a Valuable Hand Book, containing full data, specifications, illustrations, reports and detailed advice covering all kinds of waterproofing problems. FREE upon request.

tinually all seasons of the year at 100 gallons per hour. By applying a plaster coat ¾" thick 1:2, mixing the Trus-Con Waterproofing Paste to the water, we have secured a watertight job and our walls are now perfectly dry, enabling us to utilize the floors below Fifth Avenue and make a swimming pool in which we have used the paste with satisfaction.

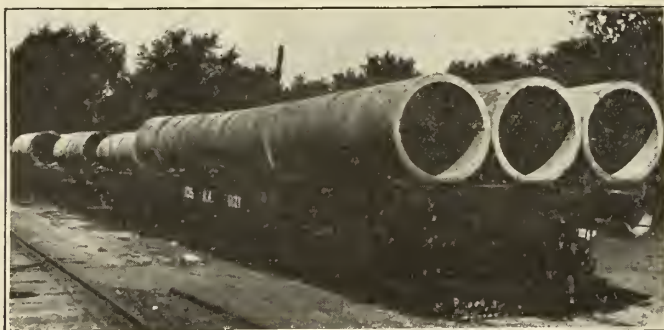
"The walls were so dry that the carpenter, thinking there was no water back drilled through the plaster coat to fasten partition, when instantly the water gushed forth in a stream with much pressure, proving conclusively that your material is a thorough waterproof, and we will always use it in our waterproofing."

dissolve it in the water used in mixing the concrete,



TELL US YOUR WATERPROOFING TROUBLES.

TRUSSED CONCRETE STEEL COMPANY 450 TRUSSED CONCRETE BUILDING DETROIT MICH.



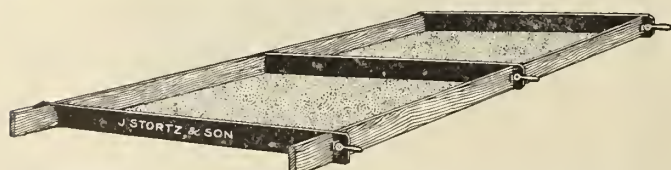
Big Money in Big Tile

The National Tile Machine

Makes tile 14" to 36" in diameter or larger if desired up to 48"—24" or 36" long. The demand for big cement tile is increasing and there's a good paying profit in their manufacture. Get into the BIG business class by establishing a plant for BIG tile. Tile made on the National Machine are tamped hard—they are dense and strong—they interest engineers and highway officials. Write to us for BIG tile information.

Quinn Wire and Iron Works

E 12th St., Boone, Ia.



EXPANSION JOINT PLATES & FORM HOLDERS

No nails, no stakes, no braces, plates clamp securely to side forms, holding them in position. Perfect expansion joints produced. You save money on the cost of the work and you produce a better job. Ask for catalogue including 150 sidewalk making tools.

220-222 Vine St.

John Stortz & Son

PHILADELPHIA, PA.



CHASE CARS

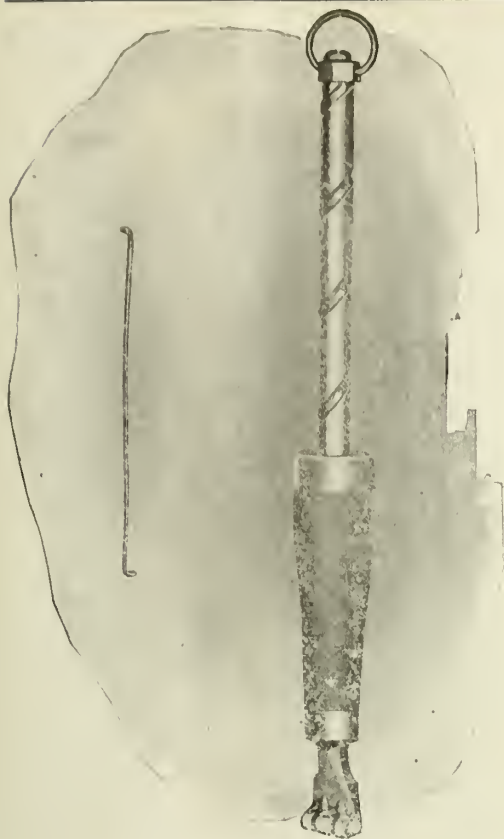
for handling
Block,
Tile,
Sand, Gravel,
Stone, etc.

WE MANUFACTURE A COMPLETE LINE

of cars for all purposes, in the plant or on the construction job. Write for Catalog.

The Chase Foundry & Mfg. Co.

Columbus, O.



WIRE TIE AND TWISTER
Patent applied for.

METHOD OF
FASTENING
TAG



Manufacturers of Wire Bag Ties for all purposes. All length wire ties manufactured for tying reinforcing rods. Write for prices, etc. Patent applied for.

United Wire Tie Company

Dept. E.,

1341 Nicholas Bldg.,
Toledo, Ohio.



WATERPROOFING PRODUCTS

A Complete Series of compounds for every possible need of the engineer and builder for stone, brick or **concrete** under conditions where anything from heavy subterranean water pressure to ordinary moisture and weathering are to be resisted. In other words, no matter what the water trouble, we can solve it for you.

Write for literature describing further what we mean.

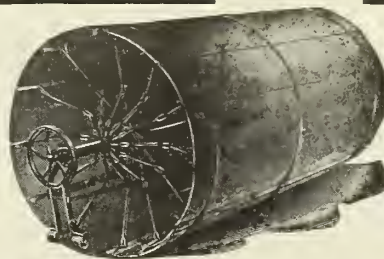
WATERPROOF ENGINEERING COMPANY

Waterproofing Engineers and Chemists
928 First National Bank Bldg., CHICAGO, U. S. A.

The Jack-Knife and the Umbrella

Both ideas are found in the Merillat Culvert Core. It expands and contracts just as an umbrella does; it folds up like a jack-knife when you want to move it.

It may be expanded from 20 inches diameter to 4 feet—makes culverts 16, 18 or 20 feet long. It may be moved about on wheels, which fold out of the way when concrete is being placed.



One Form for all Sizes Concrete Culverts

There is money in the culvert business if you don't have to invest in numerous forms for culverts of different size. Buy a Merillat form and expand it or collapse it to mold the culvert you want.

Culvert Book Free

Write us about our free book on culverts: How to make them, what they cost, details of form work, etc.

Merillat Culvert Core Co.

Oak and Railroad Sts.
Winfield, Ia.

8 Interesting Letters

Kramer Automatic Tamper Co.,
Peoria, Ills.

Madison, Lake Co., Ohio, Nov. 17th, 1911

1. Gentlemen:—
Replying to your favor of the 3rd inst., in regards to the working of the Tamper you sold me last Spring, I will give you a few of the remarks I hear everywhere I go in regards to my blocks, which I never heard before I got the Tamper. One man said he would sooner have my 8x8x16" blocks than any 8x10x16" hand tamped block made. Here is the last order I got. This is the way I received it. A gentleman came to my shop November 4th, and stood and looked at the Tamper running, while I was cleaning up. I told him I would be through in a few minutes. He said he just wanted to see it run, was all. He asked me what I wanted for my blocks. I told him and he said, get me out 1500 soon as you can, and he is hauling them now. They ask me why I don't keep them on hand. I have given that up since I put the Tamper in. The only way I could get any ahead would be to sell the Tamper, and then I would get a yard full.
I have now at present, orders to make yet this fall 2500 blocks.
Sorry to say that I could not get you a photo of my place. I have built another large building, 30x60.
I should advise any block manufacturer to have a Kramer Tamper installed, as mine has paid for itself this season.
Now I have not told you how many you could make, as that depends on what kind of help you got. We have made 90 in one hour, and have made 3 in 1 1/4 minutes. If you want to know anything about the repairs, you can find it is not very much. The cost to me was only \$6.00.
Hoping this will be satisfactory, as I could talk Tamper day and night.
I will answer any letters, stamps enclosed.

Respectfully yours,
CHAS. S. ELDRIDGE.

Kramer Automatic Tamper Co.,
Peoria, Ills.

Waterville, Maine, Nov. 10th, 1911.

2. Gentlemen:—
After using your Automatic Tamper nearly two years, making Miracle Double Air Space Blocks, I have only words of commendation for the work the machine does. Blocks can be made faster, and much easier and of better quality, than by hand tamping.
Yours truly,
EMERY HILL CON. CO.,
Edwin Towne, Treas

Kramer Automatic Tamper Co.,
Peoria, Ills.

Hampton, Iowa, Nov. 14th, 1911.

3. Gentlemen:—
The automatic Tamper that I bought of you last Spring at the Chicago Cement Show has given the best of satisfaction, both as to quality and quantity of blocks produced.
As to the quality, the machine tamped blocks weigh about ten per cent more than the hand tamped, proving that the machine tamped blocks must be more dense.
I use facing on all blocks, and make the concrete wet enough so that the water shows on the outside of the blocks when removed from the machine.
I consider the tamper will double the output of a crew of two, three or four men. As to speed, four men have made five 8x8x24" with facing and carried them away to cure in five minutes and twenty seconds.

Yours truly,
G. E. SARGENT

Kramer Automatic Tamper Co.,
Peoria, Ill

Cleveland, Ohio, Dec. 12th, 1911.

4. Gentlemen:—
In regards to your letter of the 7th inst., on the merits of your Tamper installed in my shop, I must say I have seen several different kinds of tampers, but have not seen any which I would trade mine for. I installed it about 18 months ago, and have had very little trouble with it.
I would not part with it for \$500 if I could not get another one. No block maker can afford to do without one, because it makes a much better block than you can make by hand.

Yours truly,
H. P. BENNETT.

Kramer Automatic Tamper Co.,
Peoria, Ills.

Lafayette, Ind., Nov. 17th, 1911.

5. Gentlemen:—
After having used "The Kramer Automatic Tamper" in connection with the making of all cement blocks, we are pleased to report that it has proven satisfactory in every respect, and we are well satisfied in every respect with the results obtained.
Heretofore it was practically impossible to produce and market blocks as we wished, but since the installation of your Tamper, all the "hand tamped" defects have been eliminated, which has created a demand for "Kramer Automatic Tamped Blocks."
Owing to the simplicity of the "Kramer Automatic Tamper," it very seldom needs attention, and as yet, after good hard usage, has not inconvenienced us in the least.
We will be glad to recommend the Kramer Automatic Tamper to any one, at any time, so do not hesitate to use us.

Yours very truly,
HENRY J. KESSENER LBR. CO.,
Will D. Kessener, Treas.

Kramer Automatic Tamper Co.,
Peoria, Ills.

Lincoln, Nebr., Nov. 16th, 1911.

6. Gentlemen:—
In answer to your favor of the 4th inst., will say that we have had in use a Kramer Automatic Tamper, which has given perfect satisfaction.
The tamper, unlike men, never tires, and as it is easily operated, the men can work fast the entire day. In our shop with three men who do their own mixing, we turn out daily eight hundred linear feet of stone.
Thanking you for this opportunity to make public our approval of the Kramer Automatic Tamper, we are,

Very truly,
THE REIMERS KAUFMAN CO.

Kramer Automatic Tamper Co.,
Peoria, Ills.

Valley City, N. D., Dec. 11th, 1911.

7. Gentlemen:—
Regarding your letter of the 8th inst., I will say that your Tamper has given me good service. I have run it two years now without any extra expense but a new chain. Since I have installed your Tamper I find I can make 200 more blocks in ten hours, and besides, I can use them a good deal sooner, and find that I have a good deal better results. The Tamper puts more material in them than can be done by hand. And I have a good deal better sales and twice the satisfaction.

Yours most truly,
W. J. CURREN.

Kramer Automatic Tamper Co.,
Peoria, Ills.

Waterloo, Iowa, Nov. 15th, 1911.

8. Gentlemen:—
Replying to yours of the 4th inst., in which you ask how we like the Kramer Tamper we have used the Kramer Tamper for four years, in our Block Plant at Waterloo, and our experience with the machine has caused us to name it the "Dividend Payer."
Having tamped blocks by hand for a period of five years previous to installing the Tamper, we are in position to know the difference in labor cost for producing the blocks. The Kramer Tamper reduces this cost fully 50 per cent.
The quality of the blocks made by the Tamper is fully thirty-three and a third better by reason of the fact that the block maker can use a wetter concrete and can pack so much denser. We find our blocks are practically waterproof. We cannot get along without the Kramer Tamper. Wishing you unbounded success, we remain,
Yours truly,

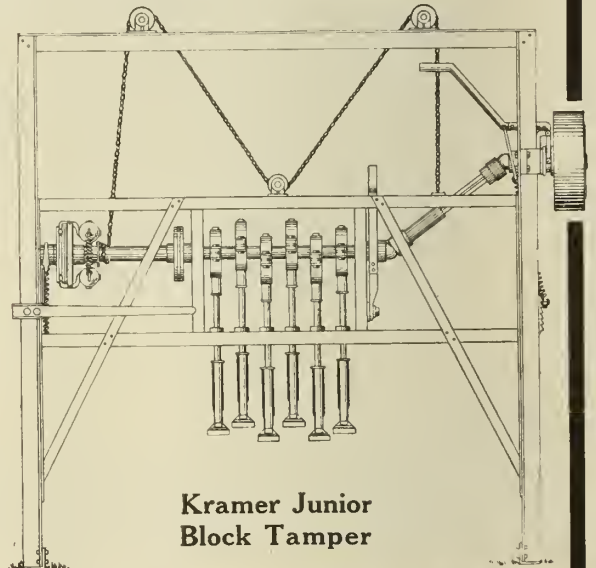
CONCRETE STONE CO.
H. L. Green, Mgr.

Kramer Automatic Tampers

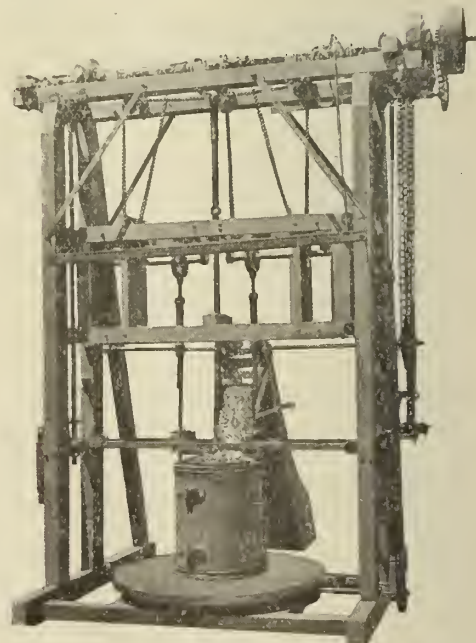
THE KRAMER JUNIOR BLOCK TAMPER is built of steel and is a great achievement for simplicity, and durability. The tampers are mounted on springs, making the stroke an elastic one. These springs also act as a shock absorber, which enables the lightest and frailest kind of a block machine to withstand the terrific tamping exerted by it, without wrecking the mold box.

It will successfully work on any size or style block machine. It will increase the output of your plant over 100 per cent, and reduce the cost fully 50 per cent.

The correctness of our statement is vouched for by hundreds of satisfied users.



Kramer Junior Block Tamper



The Kramer Tile Tamper.

A real machine for making large Sewer and Drain Tile. It has two tampers striking 600 blows per minute; it will tamp Tile to any density, does not require any pallets for either drain or sewer Tile. Let us tell you all about these machines. Write today.

Kramer Automatic Tamper Co.

491 S. Adams Street - - PEORIA, ILL.

WHITE CEMENT	SOMETHING NEW	WHITE SAND
 WATER PROOF AND READY MIXED FOR FACING CON- CRETE EXTERIOR PLASTER 150 LB. BAGS	SPECIAL PRICES IN MIXED CARLOADS TO DEALERS AND LARGE USERS	 WITH GREY CEMENT INSURES CLEAN, SHARP CASTINGS OF ATTRACTIVE COLOR 150 LB. BAGS
GROUND MICA	GUARANTEED WATERPROOFING	CRUSHED GRANITE
UNITED STATES SILICA COMPANY, 400 Peoples Gas Bldg., CHICAGO.		

Good Roads Need Good Bridges



Luten Unit Trusses Give

TO THE ENGINEER—Insurance that the steel goes into the concrete as he designed it.
TO THE CONTRACTOR—A reinforcement at reasonable cost and a unit easily handled.
TO THE WORKMEN—Ease in work and certainty that it is correctly placed in the concrete.

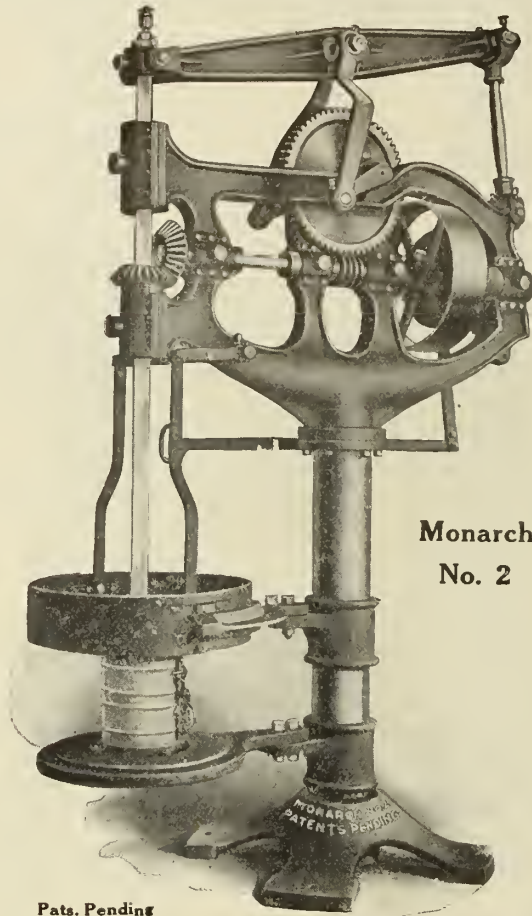
THE NATIONAL CONCRETE CO.

AGENTS.

Ohio Concrete Truss Co., Fremont, O.
Road Supply & Metal Co., Topeka, Kas.
W. B. Bassett, Minneapolis, Minn.
Ferro-Concrete Co., Harrisburg, Pa.
F. B. Stewart, Des Moines, Iowa.

CUT THIS OUT AS A REMINDER

to write for our booklet No. 7 on designs for
reinforced concrete bridges.
THE NATIONAL CONCRETE CO.
Indianapolis.



Monarch
No. 2

Pats. Pending

The Monarch Tile and Block Machine

Postively eliminates your troubles caused by the following well-known defects in tile machines of the past:

Loose Boxings

Heated Bearings

Shifting Jackets

Loss of Alignment

Frequent Repairing

Wobbling Packer Shaft

Uneven Thickness of Tile Walls

Lost Motion

Inaccessibility

Expensive Repairs

Excessive Horse Power

Loose, Shifting Pallets

Unstandardization of Parts

And 11 other defects.

Our catalogue will give you detail information.

Ask for it.

Monarch Manufacturing Co.,
777 Cedar Street, Onawa, Iowa, U. S. A.

**While at the Cement Show
Kansas City, March 14-21**

Stop at the

Coates House

Two Blocks from Convention Hall



**Cement Men Will Mix at the
Coates House**

Tenth St. and Broadway.

Only hotel in the city on car line direct from Union Station.

Rooms without bath, \$1.00 to \$2.00 per day, each person. Rooms with bath, \$1.50 to \$3.50 per day, each person.

When in Kansas City

Stop at

**The Fireproof
Hotel Baltimore**

**The Largest and Finest Hotel
in the Missouri
Valley**

**"None Better for Comfort
and Service"**

FRANK J. DEAN, Manager

Sexton Hotel

EUROPEAN

12th Street and Baltimore Avenue

Kansas City, Mo.

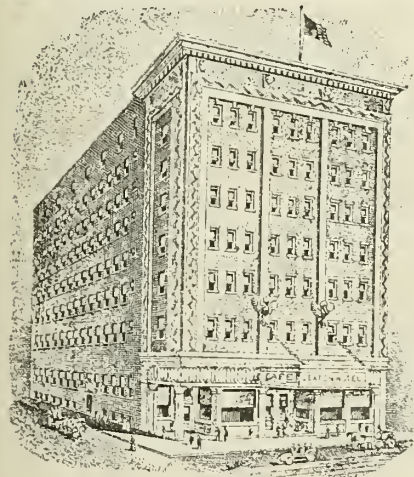
☐ Best appointed hotel in the city, and absolute satisfaction guaranteed.
☐ Cafe as good as money will produce. ☐ Handsome Grill Room Cafe
and private dining rooms. ☐ In the heart of the theatrical and shopping district.

The Dixon Hotel Co., Proprietor

F. W. Leonard, Manager

2 Blocks from Convention Hall

European \$1.00 and Up



HESS FURNACE

Sent on
Approval

We will deliver a complete heating equipment at your station at factory prices and wait for our pay while you test it during 60 days of winter weather.

The entire outfit must satisfy you or you pay nothing. Isn't this worth looking into? Could we offer such liberal terms if we didn't know that the Hess Furnace excels in service, simplicity, efficiency, economy.

We are makers—not dealers—and will save you all middlemen's profits. No room for more details here. Write today for free 48-page booklet which tells all about it. Your name and address on a post card is sufficient.

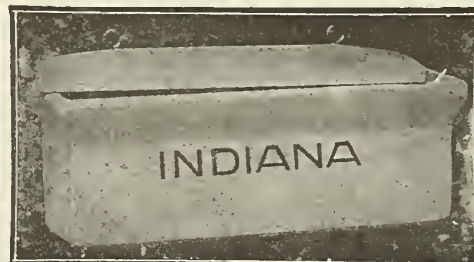
HESS, 902 Tacoma Bldg., Chicago

Makers of Hess Sanitary Steel Lockers or Medicine Cabinets for Bath Rooms. Illustrated circular free.



No. 45
"Leader" Hess
Steel Furnace
Price **\$49.00**

Delivered East of Omaha and
North of Ohio River
Pipes and Registers Extra



**WE
SELL
BURIAL
VAULT
MOLDS**

NO TERRITORIAL RIGHTS OR ROYALTIES

The "Indiana" mold is adjustable for nine sizes. With it you can make a full sized two piece vault at factory cost as follows: 5 sacks cement, \$1.75; 1/2 yd. gravel, 50c; reinforcing and cover rings, 40c; labor, \$2.00; total, \$4.65. Such a vault sells for \$50.00.

Will you write for our free booklet about the vault business?

INDIANA CONCRETE BURIAL VAULT CO.

780 Lemcke Bldg.

INDIANAPOLIS, IND.

What they said to us

in Chicago



LITTLE GIANT CONCRETE MIXER

Dozens of contractors came into our booth at the Chicago Cement Show last month, and told us how well pleased they were with their Little Giant Mixers. These men have been using the mixer for years—one man had used his Little Giant for five seasons on paving work. These men have found that this mixer turns out good concrete, in a large volume, at a low operating expense and with practically no charge for up-keep.

If this mixer will serve them that well, it can serve you. We can refer you to hundreds of users who endorse this mixer above all others. Then we'll make you our Free Trial Offer. Write us before your work gets under way.

FREE TRIAL OFFER

We offer to demonstrate the value of this machine in your own hands, on your own work, without it costing you a cent. Ask for our proposition.

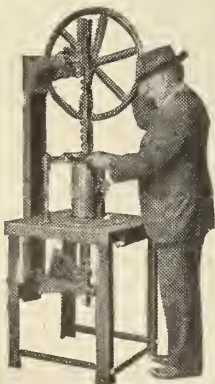
Ballou Manufacturing Company, 104 High St., Belding, Mich.

Cement Tile

The age of cement tile is here. Manufacturers cannot supply the growing demand. The field is practically unlimited.

Start right by putting in a

CARDIFF CEMENT TILE MACHINE



No pallets and no inside forms are required with this machine. No extra parts to wear out quickly.

This machine makes tile 4 to 12 inches in diameter and 12 inches long. Makes 500 to 800 perfect tile per day.

The price is so low that no one making tile can afford to be without one.

Send today for circulars.

Leavitt Mfg. Co.,
Box C. URBANA, ILL.

\$36.00

Complete ready for use with 110 ft. cable, block, boom and load brakes



LIGHT, STRONG AND PORTABLE STIFF LEG DERRICK—built for hand or power. Fitted with crucible steel fittings throughout. When writing for price, give length of boom, capacity and if winch is desired and if so, whether double or single.

LIGHT and STRONG T. P. SETTER DERRICK equipped

with steel gears and malleable fittings. Capacity 1½ tons. Has a top sheave frame which does away with a block on top. Has lugs for guy lines in front and back, and clamps to clamp an extension pole. PRICE, \$33.00, 18 ft.

SASGEN BROS.

Manufacturers of

CIRCLE SWING STIFF LEG } DERRICKS
"A" FRAME, POLE AND SETTER }

2053-57 Racine Ave., - - - Chicago, Ill.

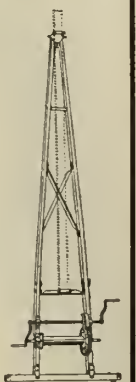
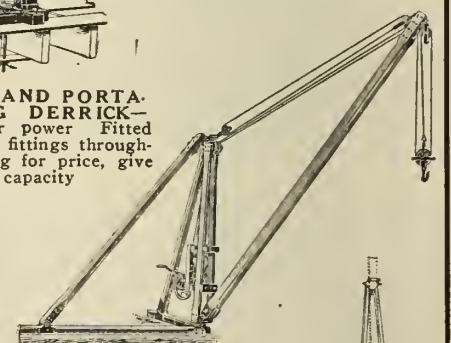
New York Office: 103 Park Ave.

Write for illustrated circular F.

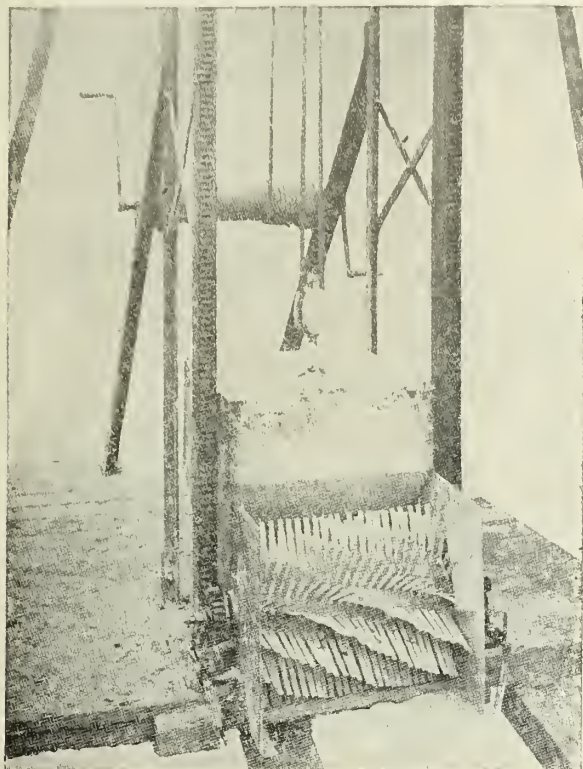
The Only Practical Hand Power Circle Swing Builders Derrick

for hoisting timber, joists, flooring, door and window frames, stone, iron girders, concrete blocks, concrete reinforcing bars and forms, etc.

MACHINES SHIPPED ON TRIAL TO RELIABLE CONTRACTORS. Our Motto is SATISFACTION OR NO SALE. Immediate shipment guaranteed.



AUTOMATIC Stucco Machine



A New Device For the Rapid and Economic Application of Cement Plaster and Rough Cast Stucco to Exterior Walls. Will do in One Day what Two Men Take a Week to do by Hand

This machine is mounted on a platform and placed on rollers. Easily moved. The uprights (or frame) resemble bare construction of an elevator shaft and can be extended as high as desirable. Made in sections and easily transported.

The steel springs (shown in cut) do the work. These hardened steel springs engage the bottom of the hopper, which is mounted on the uprights. Operated by hand with windlass handles and block and tackle; this moves hopper up or down, and also revolves steel springs, throwing the Stucco with great force on the surface.

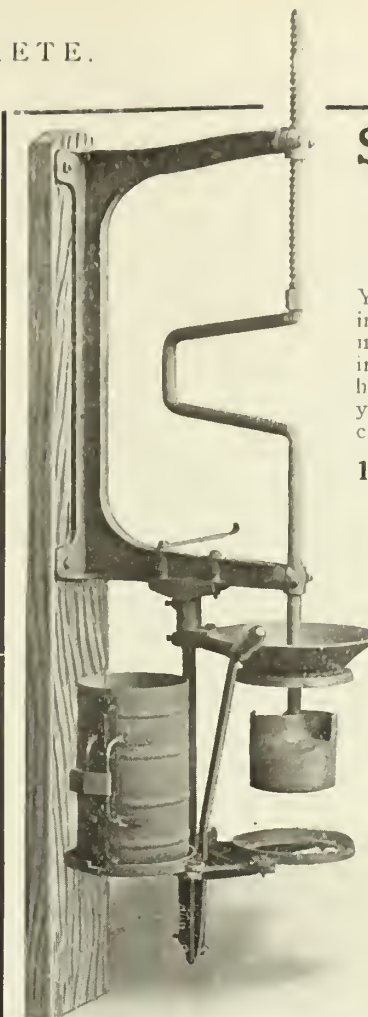
The Automatic Stucco Machine is easily and speedily operated at low cost. Work done with it is superior to that done by hand. Contractors using this machine can destroy all competition. For renovating old houses, stucco work done on this machine is as cheap as painting, adding greatly to value of building.

Further information, literature and prices furnished on request.

Territorial rights for sale; apply early.

AUTOMATIC STUCCO MACHINE CO.

Dept. C, Port Chester, N.Y. New York Office, 264 A 4th Ave.



Start in the Drain Tile Business

You don't need a large investment. The demand for tile is rapidly increasing and with our hand - power machine you can turn out first-class tile at low cost.

**1200 Tile per Day
per Man on
ACME
Tile Machine**

This machine makes tile from 3" to 8" in diameter, all 12 1/4" long. Spiral packer-head packs a strong tile. Operates rapidly and easily. Write for booklet describing this machine—it looks easy but it's really easier than it looks.

**Acme Tile
Machine Co.
LaGrange, Ind.**

Vaughan's Patent Concrete Spade

**A Tool for Finishing
Concrete Walls**

**IT PAYS FOR ITSELF
IN A DAY'S WORK.**

By use of Vaughan's Patent Concrete Spade, you can force the coarse aggregates in the concrete back, while the forms are still about the wall, and let the finer cement mortar flow forward, the perforations in the spade allowing it to come to the front. Your wall is thus given a smooth finish, without applying face mortars.

Manufactured only by

J. H. CLARK

Manufacturer of and
Dealer in

**CONTRACTORS TOOLS
AND SUPPLIES**

137-139 W. Lake St., Chicago

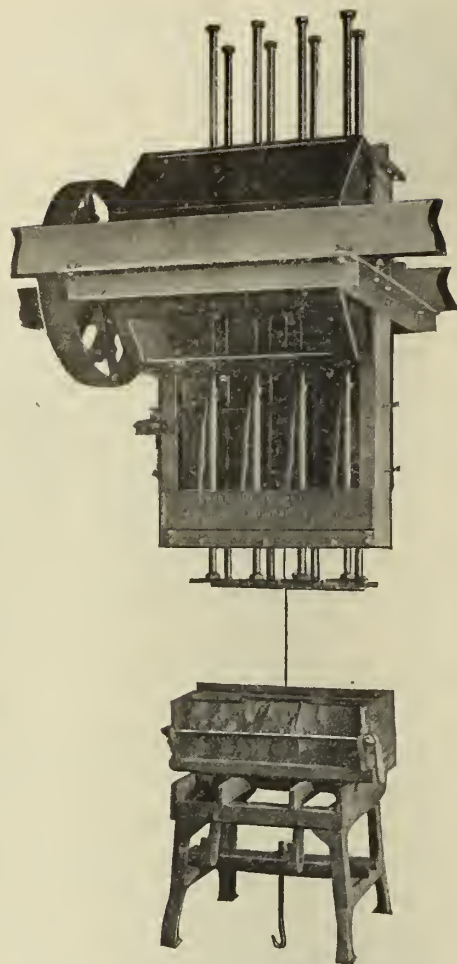


Have you a man in your plant who can strike a block 600 blows per minute?

Have you a man in your plant who works just as hard and just as faithfully at 4 P. M. as he started in the morning? What you need is an---

Anchor Automatic Tamper

This tamper requires no floor space---it is suspended over your machine. It will fit any block machine. It requires one horse power only. The eight tampers work in a dust-proof case; each tamper strikes 75 blows per minute, 600 pounds to the blow. The block is finished when the mold boxes are filled. Instal this machine; increase your output; cut your cost.



Tamper disengaged, with cover in place

Anchor Concrete Block Machine

On this machine you can make block for two-piece wall construction that will defy competition. Anchor blocks are tied together with metal ties. They make an absolutely dry wall. Equipped with circle-mold the Anchor machine will turn out Silo blocks that will meet instant sale.

Get Our Catalog and Prices

Anchor Concrete Stone Co.

Rock Rapids, Iowa



How Anchor Circle block lay up in a silo wall. Note complete blanket of air in the wall. Also groove in block to receive reinforcing.

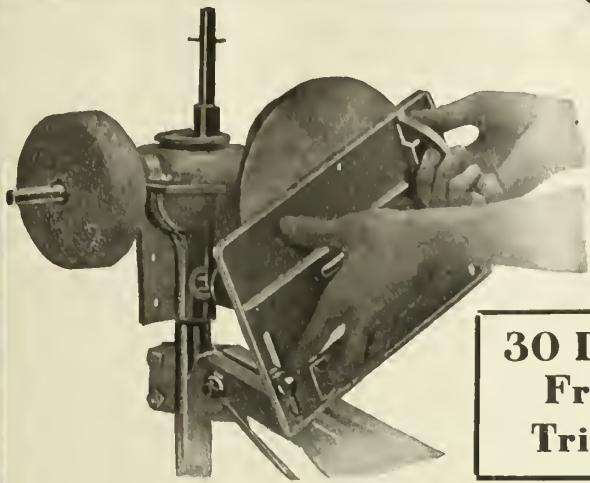


Anchor Continuous Air Space Silo build by John Olsen, Rock Rapids, Ia. This Silo is 16 ft. in diameter by 36 ft. in height; four foot of the height being underground.

Anchor Block Walls are
Always Dry Walls



It is easy to lay
Anchor Blocks.



**30 Days
Free
Trial!**

Polishes Concrete face plates

No promises! No red tape! No money needed!

You can try this all-metal, shaft-drive tool grinder, with its Dimo-Grit (artificial grit) wheels for 30 days absolutely free, and without putting yourself under any obligations. You can put all your tools in bright, shiny, keen condition, and you will be amazed how quickly and easily you can do it. You can sharpen your chisels, twist drills, draw knives, hatchets, augers—gum your saws and put a keen edge on every tool—all at no cost. You can find out how amazingly easy it is to keep face plates polished as smooth as plate glass. Use the outfit 30 days—then if you want to part with it, send it back at my expense.



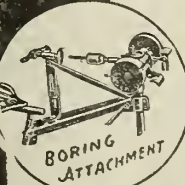
JIG SAW



LATHE AND SAW



SAW
OUTFIT



BORING
ATTACHMENT

A Workshop in Itself

Besides the sharpening attachments which are included in the sharpening outfits, there are 17 other attachments from which you can select what you want. In this way you can secure a forge, turning lathe, drill, circle saws, jig saws, metal polisher, etc.—17 in all—simply by getting these attachments to go on your Grinder.

If you were to purchase machines to do the same work that these attachments do, it would cost a good deal, but by getting these attachments for your grinder you can completely equip your workshop for amazingly small cost. Our Free Book describes all attachments.

Dimo-Grit Sharpening Stones

Ask your dealer for Dimo-Grit sharpening stones, the fastest and smoothest cutting sharpening stones in the market—look for the name "Dimo-Grit" on the stones.



14 Machines In One

1—Fine Dimo-Grit wheel. 2—Coarse Dimo-Grit wheel. 3—Universal tool rest. 4—Chisel and plane bit guide. 5—Dimo-Grit razor hone. 6—Dimo-Grit scythe stone. 7—Dimo-Grit saw gummer. 8—Felt polishing wheel. 9—Medium Dimo-Grit wheel. 10—Cloth buffing wheel. 11—Dimo-Grit oil stone. 12—Dimo-Grit pocket hone. 13M—Plane bit honing attachment. 14M—Twist drill sharpening attachment.

LUTHER DIMO-GRIT Tool Grinder

**Dimo-Grit cuts hardest steel as emery
does soft copper.**

Dimo-Grit crystals are artificial diamonds—made of the same elements as real diamonds, fused in the terrific heat of the electrical furnaces at Niagara Falls. On the wheels of the Luther Hummer Grinder turning 4,000 revolutions per minute by foot power, Dimo-Grit peels steel off in tiny shavings, does not develop heat, no need of cooling with water, no danger of drawing temper. Dimo-Grit is the newest artificial diamond sharpening substance—the wheel for steel—leaving the smoothest, keenest edge. 25 times faster than grindstone, 10 times more efficient than emery. Carborundum wheels supplied when wanted.

Shaft-drive—foot and engine power

Mechanic's outfit consists of machine and 14 attachments—17 other attachments from which you can select what you want.

No other machine is like the Luther—it is all steel and iron—nothing to wear out—steel shaft drive like an automobile—ball bearings, dust-proof bearings. Costs no more than cheap chain-drive grinders. Runs as easy as a sewing machine. The 14 mechanic's attachments equip you for all kinds of sharpening, buffing and polishing. 5 years guarantee.

Return this Coupon Today

We will send you 40 page free book showing all ways this outfit saves money. Then you can decide if you want to try it for 30 days absolutely free. Send back the coupon today. You will put yourself under no obligations. It is simply a request for full information. Tear out the coupon now and send it back today.

Luther Grinder Mfg. Co.
2130 Michigan St. MILWAUKEE

COUPON.

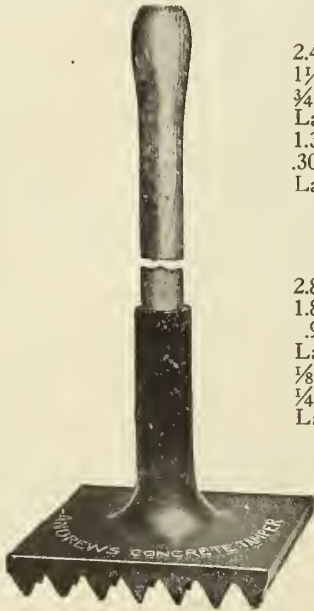
Luther Grinder
Mfg. Co.,
2130 Michigan St.,
Milwaukee, Wis.

Please send without cost or obligation, your 30 days Free Trial Offer and large book free.

My name is.....
My address is.....

EXAMINE THESE FIGURES

An actual comparison of the cost of laying a six-inch concrete floor with granolithic surface with the Andrews Concrete Tamper, and the old method of laying the top surfaces separately.



100 SQUARE FEET WITH SEPARATE FINISH REQUIRES

2.40 barrels cement in 5" base (1/2 3/4 concrete) at \$1.50.....	\$3.60
1 1/2 cubic yards stone in 5" base at \$1.75.....	2.625
3/4 cubic yard sand in 5" base at \$1.20.....	.90
Labor placing 1 5/9 cubic yards concrete at \$1.50.....	2.33
1.36 barrels cement in 1" top (1, 1 1/2) at \$1.50.....	2.04
.30 cubic yards sand and pea stone at \$1.75.....	.525
Labor mixing, placing and trowelling at \$0.02 sq. ft.....	2.00

Total cost per 100 square feet..... \$14.02

100 SQUARE FEET USING ANDREWS CORRUGATED TAMPER

2.80 barrels cement 6" (1/2 3/4 concrete) at \$1.50.....	\$4.20
1.80 cubic yards stone at \$1.75	3.15
.90 cubic yards sand at \$1.20	1.08
Labor placing 1 23/27 cubic yards concrete at \$1.50.....	2.78
1/8 barrel cement for sprinkling top at \$1.50.....	.19
1/4 cubic foot sand for sprinkling top at \$1.20.....	.01
Labor trowelling and tamping at \$0.0125 square foot.....	1.25

Total cost per 100 square feet 12.66
 Saving by use of Andrews Tamper..... \$ 1.36

That shows clearly the direct saving of finishing floor at the time base is laid by using Andrews Tamper, without running two mixing gangs. Yet the price of Andrews Tamper is only \$2 each. Discount in lots of 1/2 doz. or more. Sent on approval. Money returned if you are not satisfied.

HAROLD L. BOND COMPANY

383F Atlantic Ave., Boston, Mass.

Foreign Agents: The(U. K.)Winget Concrete Machine Co., Ltd., 9 Star Buildings, Newcastle-on-Tyne, England



OPERATION COMPLETED
READY TO DETACH

THE CURRY TYER GUARANTEES

Greatly reduced labor costs,

Three times faster than pliers

Mechanically uniform tightness of tie,

Secure. Eliminates careless tying

Cheapest laborers can operate successfully,

Eliminates skilled laborers.

Full speed in cold weather.

Tools are not lost or stolen.

Ties are exactly fitted to rods

No lost time or waste cutting wire.

Catalog G, prices and information
on request.

Clifford L. Miller & Co.,

110 East 23rd St.

SOLE AGENTS

New York, U. S. A.



BRONZE FINISHING TOOLS

We have at last succeeded in placing on the market a BRONZE line of sidewalk tools which are sure to meet with approval from all sidewalk men. The workmanship and quality of the tools cannot be excelled and they are fully guaranteed in every respect. Write for catalog.

In addition to the bronze line we handle and make a full line of malleable iron finishing tools, concrete mixer, block machine, brick machine, steel sidewalk forms, post molds, pipe and tile molds, tile machines, fancy molds and many other machines for concrete work.

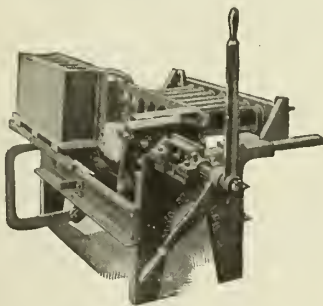
Catalog of full line FREE on request.

Arrowsmith Concrete Tool Co., Dept. C-2 Arrowsmith, Ill

HAYDEN CONCRETE BLOCK MACHINERY

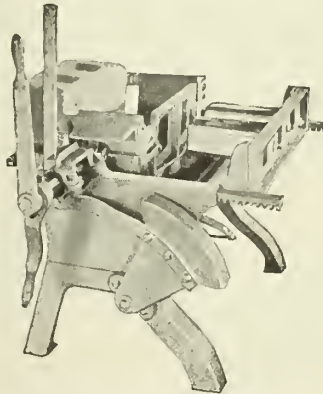
repair parts, or want to add a second machine to your equipment. Our line is large. booklets describing those machines.

Our line of machinery today represents the best ideas for mixing and molding concrete into building units. When you buy a Hayden machine you buy of an old established company, one that you know is going to be in business in case you want. Tell us just what machines you are interested in and we'll send



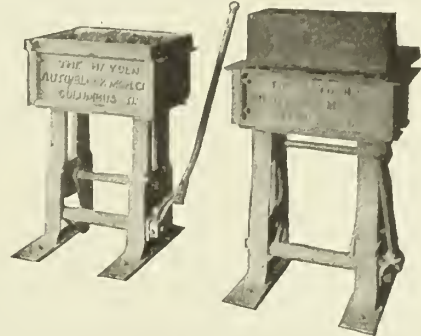
The New Hayden 24 in. Down-Face Machine

This new Hayden 24 in. Down-Face Machine makes blocks any thickness of wall from 4 in. to 16 in., any height of block from 4 in. to 12 in., any length from 2 in. to 24 in. Blocks all styles of faces in straight, angle and circle work. Write for circular.



Hayden Automatic Down-Face Block Machine

Made in the following sizes: 16, 18, 20, 24, 32 and 36 inch. Built on correct principles—one of the oldest face-down block machines on the market. It has been kept right up to the minute with modern improvements.



Hayden Stripper—For Plain Face Block

The Hayden Stripper is used in turning out standard blocks of plain design, for stucco walls, foundations, etc. It pays for itself quickly. You don't have to operate an expensive machine on a low-priced product—make your plain block on the Stripper. Wet mix may be used.

Any Pallet Will Fit Them: We build these machines to fit any pallet no matter what size or make, at no extra cost to you.



Concrete Mixers

Highest grade concrete mixers. Write us before buying.



Block Maker's Trowel

[Only trowel on the market designed specially for the block maker. Blade of the best saw steel, highly tempered and polished, with edges slightly rounded. Size 12 in. long, 5 in. wide. Very durable; brass handle; adjustable so worn blade may be replaced by a new one.

See Us At
Kansas City,
Spaces 52-53



Ornamental Molds

You can order molds for a few ornamental pieces—pedestals, columns, caps, etc.—and as the demand increases for product, add to your line. Ask about our adjustable Angle Molds, adjustable Sill & Lintel Molds, etc.

HAYDEN AUTOMATIC BLOCK MACHINE COMPANY

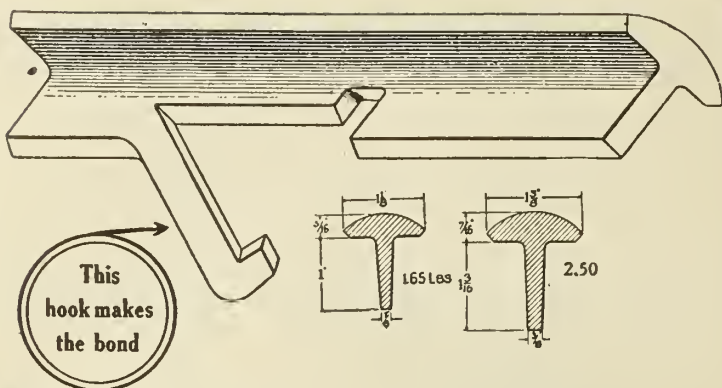
112 West
Broad St., Columbus, Ohio



How We Drop a Dollar in Your Pocket

With each mold we give as a premium an article that is worth the price of the mold.

Johnson Vault Mold Co.
Greenfield, Ind. Topeka, Kans.
Eastern States Western States



EBCO Hook Curb Bar

is a steel member to be embedded when the concrete is poured, forming a permanent protecting edge and acting as a reinforcing member as well.

These bars have shear members which bond perfectly with the concrete. Rolled in straight lengths and in curves for street corners. They come in 10 ft. lengths, seven anchors in each length. Write for circulars.

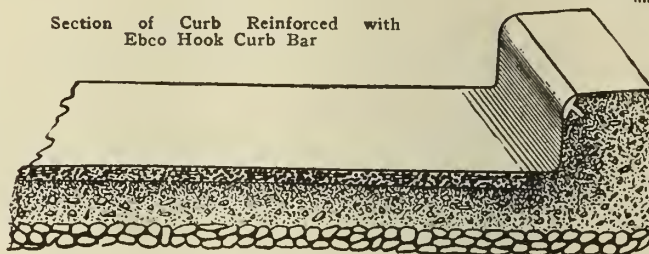
EDWARD E. BUHLER & COMPANY MANUFACTURERS

Sales Office: 103 Park Avenue - - - - - New York City
Factory: Pittsburg, Pa.
Western Agents: Waterhouse, Price Co., San Francisco, Cal.
Louisiana Agents: Standard Paving & Construction Co., 321 Godchaux Bldg., New Orleans, La.
New England Agents: Warner, Miller Co., New Haven, Conn.
Wilkesbarre: Ralph C. Hull, Wilkesbarre, Pa.
Milwaukee: The Contractors' Co-operative Co., Merrill Bldg., Milwaukee, Wis.
Canton and Akron, O.: Fred Fogarty, Akron, Ohio.
Montreal, Canada: Stinson-Reed Bldrs. Supply Co., Ltd., Montreal.
Baltimore, Md.: Hudson Cement & Supply Co.

Protect and Reinforce the Corners of Your Concrete Curbing

City engineers and contractors who have had trouble with the old sandstone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear.

Section of Curb Reinforced with Ebcro Hook Curb Bar



FOR SALE

Portland Cement Plant

We offer for sale a complete 1000 barrel dry process Portland Cement factory located at Elk Rapids, Michigan—water and rail shipping facilities. Entire plant remodeled within the last few years and up-to-date machinery installed. Will sell as a whole or dismantle and sell parts. This is a bargain.

Petoskey Crushed Stone Co.,

Petoskey, Mich.

CEMENTS AND CONCRETE ROAD AND PAVING MATERIALS

Examined and Tested

Rocks, Clays, Bricks, Blocks, Asphalts, Oils, Tars, Emulsions and all types of Bituminous Materials.

Improvements in Industrial Products and Processes.
Utilization of Waste Products, etc.

Inspections
Investigations

Specifications
Advice

Correspondence
Solicited

THE INSTITUTE OF INDUSTRIAL RESEARCH

Allerton S. Cushman, Ph. D., Director
Prevost Hubbard, Consulting Chemist
Chief, Division Roads and Pavements.

19th and B Sts., N. W.

Washington, D. C.

MONTROSS METAL SHINGLES



All Our Agents Find it Well Worth the Time.

only increase your income but will also introduce you to many new customers. Builders everywhere are learning and profiting by this every day. Combining the agency for selling MONTROSS METAL SHINGLES with your business will not

Montross Metal Shingles are the cheapest and most economical roofing made. Will last as long as building. Made of prime tin, heavily embossed, galvanized or painted. Easy to lay—no soldering. Big margin of profit. One job will convince you.

Exclusive
Territory
Given

MONTROSS METAL SHINGLE COMPANY
104 Erie St., Camden, N. J.

Live
Agents
Wanted

GENUINE BANGOR

Roofing Slate, Structural Slate, Blackboards

EAST BANGOR CONSOLIDATED SLATE CO.

EAST BANGOR, PA.

Large Facilities

Prompt Deliveries

1912
MODEL



To Be or Not
to Be Without
a "Mitchell"—that
is the Question

?

After you receive our new 1912 catalog and have investigated the Mitchell Improved Crusher and found it to be the most efficient, most economical, as well as the simplest and most durable then ask yourself "Can I afford to be without a Mitchell?"

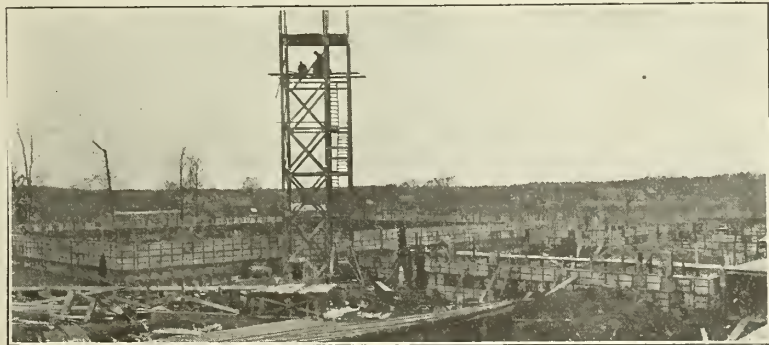
No matter what you crush, the Mitchell will save you money. It has a score of exclusive features—made in 15 different sizes in capacities from 5 to 300 tons per 10 hour day. Write today for new 1912 catalog. You can't afford to wait.

Canadian Factory
Mitchell Crusher Mfg. Co.,
Bathurst & Niagara Sts., Toronto, Can.

Eureka Stone & Ore Crusher Co.

1-3 B Avenue
Cedar Rapids, Iowa

Reichert Metal Forms for All Concrete Work



Reichert Metal Forms are adaptable for any concrete construction work, either large or small.

Reichert Metal Forms do away with wooden false work. No kindling left after job is completed. Reduces labor cost by ONE-HALF and lower. Better results for less money.

Satisfied A. Mönsted Co. of Milwaukee, constructors of largest concrete malting plant in the

world; also American Sheet & Tin Plate Co. at Gary, Ind., on colony of residences and apartment houses, and hundreds of others users of Reichert Metal Forms throughout the country.

WHY NOT YOU?

Get in line before spring work opens, and let Reichert Forms satisfy you and your clients.

Write for Catalogue and Circular today. It will pay you to investigate.

Reichert Mfg. Co.

Metropolitan Block,

Milwaukee, Wis.



There's a Uniformity About Koehring Mixing No Other Mixer Equals

There are three continuous, independent opposed mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

And the important feature is that the actions, being independent and opposed to one another, there is an intermingling of the entire mass of material contained in the drum.

You will mix concrete in the shortest time because the Koehring Mixer has three independent mixing actions.

You will get it out of the drum quickest because the Koehring Mixer has the most rapid discharge. You will run continuously because the Koehring mixer is built better and stronger than others.



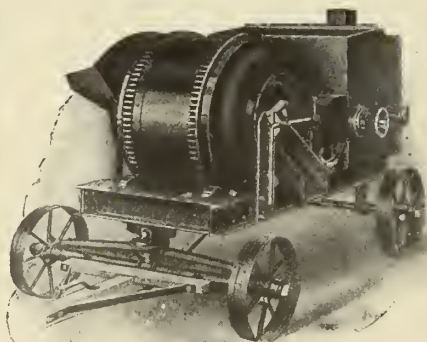
There are equally important advantages in the mechanical construction of the Koehring Mixer:

The heavy cast special metal Koehring drum will outlast the drum of any other mixer.

The trunnion rollers are keyed on to the axes and rotate as a unit precisely in the same manner as a railroad truck, making impossible "wobbly" drums and rollers.

The charging bucket raises to nearly vertical position, enabling all material to pass into drum without pounding the bucket.

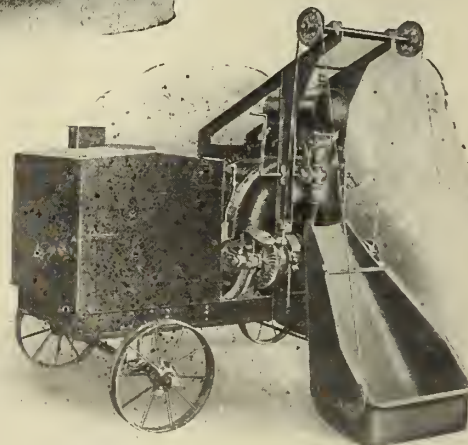
Study any other detail of the Koehring Mixer and you will find the same dollar-saving quality.



A Small Koehring Mixer, Equipped with Standard Hopper Showing House over Gasoline Engine.

To facilitate the mixing and placing of concrete in Silo Forms, we have designed a small Mixer with Hoisting Drum, and a suitable Concrete Elevator for hoisting the concrete from the Mixer.

Your copy of our new 1912 Catalog is awaiting your request for it. Better write at once.



Koehring Mixer Equipped with Side Loader and Water Measuring Tank.

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The Non-Staining Portland Cement of quality. The granite exterior of the New Municipal Building, New York City, is being laid and backed with Atlas-White because it is Non-Staining.

If you cannot get Atlas or Atlas-White, write to

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Steel Forms for Sidewalk and Curb and Gutter Work

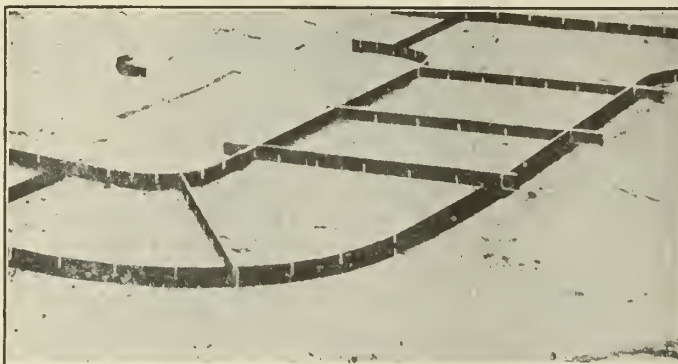
ONLY form on market Adjustable to all Widths of sidewalk

Contractors using the Ubbink Adjustable Forms are saving 100% of their lumber expenses, 20% of their labor costs and save 2c per square foot on all sidewalks.

Ubbink system is the only ADJUSTABLE Form on the market with which all widths of walk can be made with same set. Flexible side-pieces will make all curves.

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Order an outfit, use it 10 days. Abuse it in any way and after using 10 days and it doesn't prove to be superior to all other makes, pack and return at our expense.

Get our new Hand Book written by the most experienced sidewalk man in the country. Every contractor should have this book, as it contains very valuable information relative to sidewalk and curb and gutter construction.

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Are you in the common place path that the uninitiated have dug?



REPUTATION cuts its own paths, that's its job.

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The Reliance Pulverizer

Capacity 2-6 Tons per hour

A machine that will reduce raw material to a product ranging from

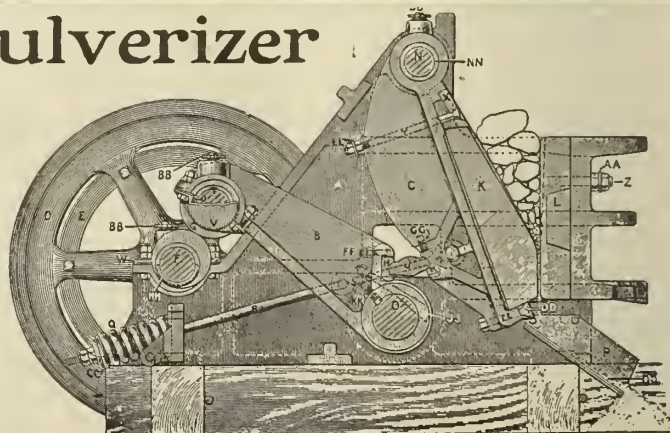
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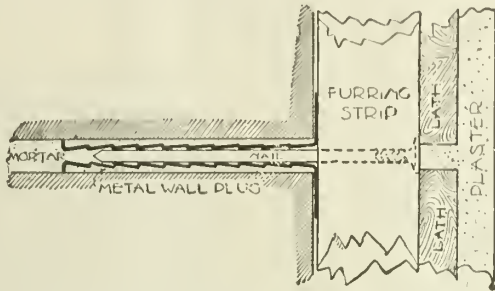
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RUTTY METAL WALL PLUG

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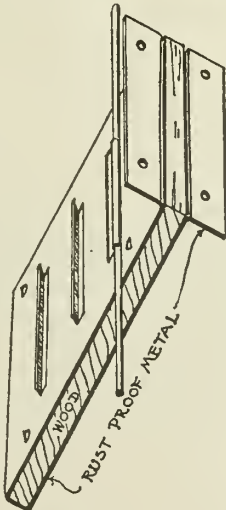
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ARE YOU A USER OR A LOSER?

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When You Order a Mixer Specify a Novo Engine to Run it

Use it for all your cement machines.

That's what a big proportion of cement men are doing because they know from experience what unequalled service Novo Engines give.

The Novo runs as steady as a clock and you know what an advantage this is in concrete work. The

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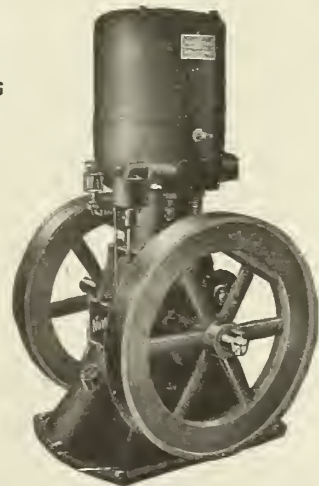
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NO FAN
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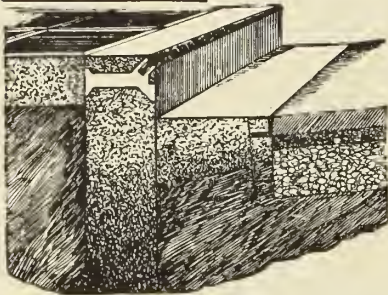
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THE BAR WITH A FOURTEEN YEAR RECORD

THIS BAR IS SELF-ANCHORING. THE DOVETAILED WEB HOLDING IT FIRMLY IN PLACE EVERY INCH OF ITS LENGTH, PRESENTING A RESISTING DEPTH OF TWO INCHES OF SOLID STEEL, AT EVERY POSSIBLE POINT OF IMPACT.



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ABSOLUTELY NON-BREAKABLE
CHEAPER THAN GRANITE



GALVANIZED STEEL CORNER BAR prevents Chipping or Breaking on Edges.

MECHANICALLY PERFECT AND UNEQUALLED FOR CURVED CORNERS.

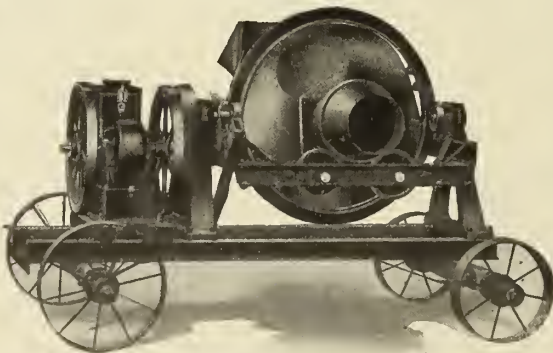
OVER FOUR MILLION FEET IN USE IN MORE THAN FOUR HUNDRED CITIES IN THE UNITED STATES

THIS CURB WILL STAND HARDER USE AND LAST TEN TIMES AS LONG AS PLAIN CONCRETE CURBING

CONTRACTORS can make money by laying this curb. CITY ENGINEERS can save money by specifying it. ARCHITECTS are invited to read pages 238 and 239 "Sweet's Index."

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This Polygon Junior Mixer

Is just the right size for the contractor putting in Sidewalks, Foundations, Floors, Retaining Walls, Culverts, Small Bridges, etc.

Light and portable—weighs 2650 lbs.—holds six cubic feet.

Will mix concrete for less than one cent per cubic yard.

It's reasonable in price.

Waterloo Cement Machinery Corp'n.

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Manufacturers of the Great Polygon Line of Mixers, Contractors' Hoists, Derricks, Material Elevators, Etc.

The "Kent" Precision Mixer

It is a well built concrete mixing machine, built on scientific principles. It measures and proportions materials accurately and delivers mixed concrete at lowest cost. Get our mixer catalog. Ask about the "Kent" Mortar Mixer.



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Will Save You Big Money on Every Job.

Conservative Capacity: 90 cu. yds. per day. It can always be set to discharge direct into forms, cutting out $\frac{1}{4}$ the wheelers. It saves you $\frac{3}{4}$ the transportation charges and all repair bills, as compared with any other mixer.

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New Principle

Plows, Hoes, Stirs, Mixes Mortar, Plaster or Concrete. Insures a thorough mixture under all conditions. The only satisfactory color blending machine.

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Operates by either Engine, Motor or Hand Power. Most Reasonable Priced Good Mixer on the Market. Sold on Trial—Satisfaction Guaranteed. Write at once for FREE Catalogue, Prices and Terms.

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Themselves Waterproofing

Give them the chance they deserve and you will find the best waterproofing that ever existed. In this day and age, however, the slogan on all work is HURRY—and Portlands are not given the chance.

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A book just off the press, tells the whole story. Mailed free to Architect, Engineer, Contractor or Dealer.

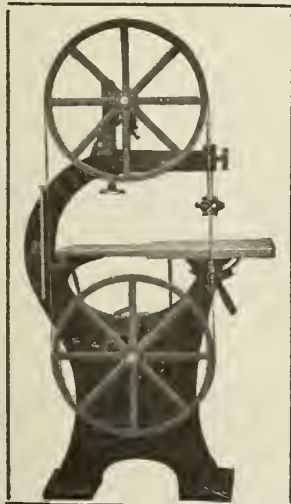
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This Crescent Band Saw Makes \$1,000 a Year For One Concrete Block Man.

In the O. C. Barber concrete products factory, Barberton, O., a shop is maintained for making special wood patterns. A Crescent Band Saw was installed a year ago. Since then the pattern shop force has been cut down by one man and more and better work is being turned out. That means \$1,000 a year added to the profits.



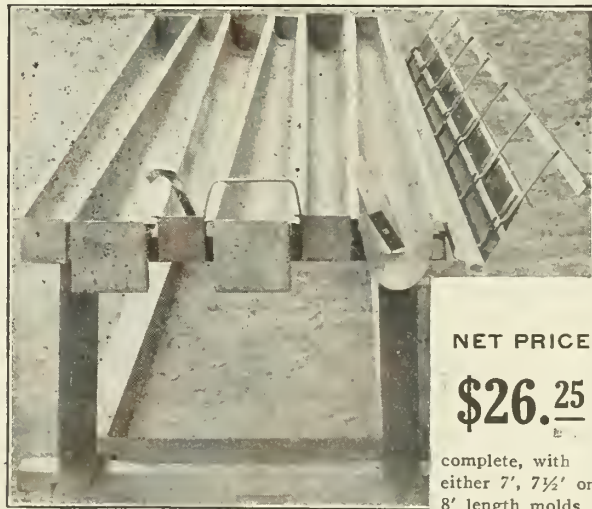
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Whether you operate a concrete plant or do general construction work, you need wood-working machinery. It cuts your labor cost and produces better work. We have pattern-shop equipment and combination saw tables that may be moved from job to job. Get our catalog and see if you can't cut down your force by doing some of your own woodwork at a reasonable figure.

The Crescent Machine Co.

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THE "D & A" SIX MOLD SIZE CEMENT FENCE POST MACHINE



NET PRICE

\$26.25

complete, with either 7', 7½' or 8' length molds.

A profitable investment for any Cement Products Plant. One sack Cement, 1/6 yd. gravel, 12 lbs. steel and ¾ hour labor will make six posts, at a cost of less than 16c each. Also made in 10 mold size.

"D&A" Molds are in use in all parts of the U. S., and many foreign countries. Eleven Ry. Co.'s, U. S. Dept. of Agr., and Dep't. of War.

The "Shaking System" which makes them Wet (not slush), no pallets, no tamping. "D&A" Tie Wires fasten fences securely and most cheaply.

New 1911-12 Catalogue ready since Nos. 1st, profusely illustrated and explains construction and operation of the "D&A" Molds in detail. It's Free. Send now for prices and discounts.

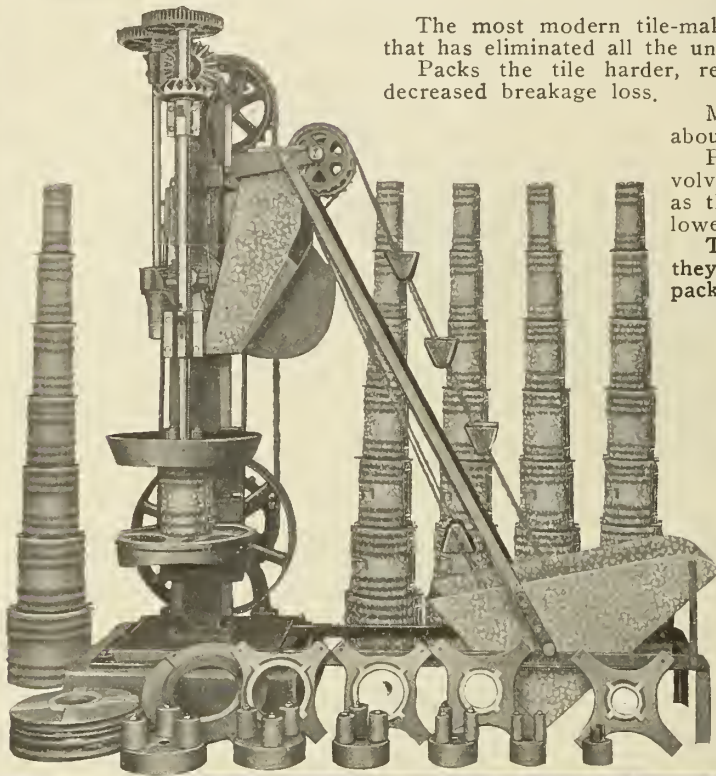
Save 25 per cent by buying a "D&A" Post Machine now.

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THE ROSBRUGH

CEMENT TILE MACHINE



The most modern tile-making equipment on the market—a machine that has eliminated all the unhandy, expensive features of older machines. Packs the tile harder, resulting in increased speed of operation and decreased breakage loss.

Main frame is one solid casting—nothing about the machine to work loose or break.

Packer shaft doesn't raise and lower but revolves in one position. The tile mold moves up as the concrete is fed in and back and then is lowered until it clears the packer.

The Rosbruch can make drain tile faster than they can be handled by any known system of packing or carrying away.

Rosbruch No. 1 makes drain tile 4, 5, 6, 7, 8, 10 and 12 in. in diameter, 12¼ in. long.

Rosbruch No. 2 makes drain tile 4, 5, 6, 7, 8, 10, 12, 14, 16 and 18 in. in diameter, and 12 and 18 in. long.

Write for illustrated folder describing the machine and giving tables of cost of cement tile manufacture.

NAPPANEE IRON WORKS

NAPPANEE

INDIANA

The Low-Down Force-Feed Concrete Mixer

HAS SEVERAL FEATURES NOT FOUND IN ANY OTHER MACHINE

With the Low Down Hoppers one man can do the work of two, as he is not required to lift the sand, stone and cement so high.

The Chain Elevator acts as a force feed, forcing the sand, stone and cement, wet or dry, into the Mixing Trough.

The Gates at the end of the hoppers are adjustable up or down to regulate the quantity, and the Mixing Trough runs from twelve to eighteen inches longer than regular, which gives a more thorough mix.

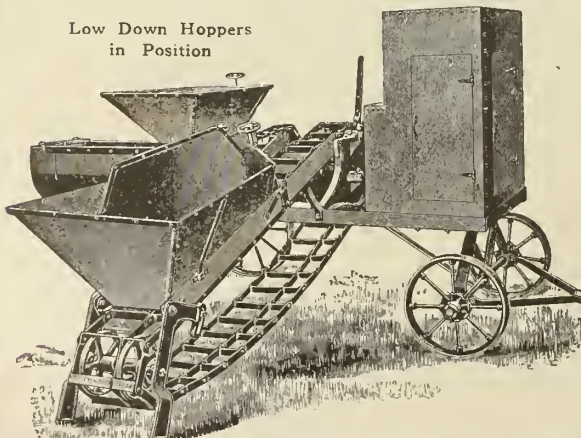
We do not have any frictional sliding measuring device to wear out when coming into contact with sand and cement.

The Mixing Trough and Paddles are easily cleaned because they are not covered up with hoppers. It is constructed of malleable and steel throughout.

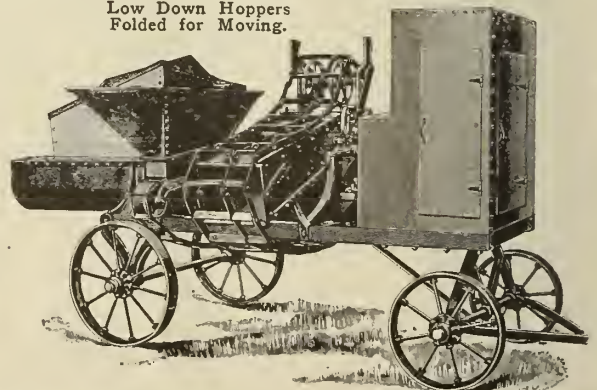
Write us about our special proposition.

ELITE MANUFACTURING CO. NO. 600 OHIO ST. ASHLAND, O.

Low Down Hoppers
in Position



Low Down Hoppers
Folded for Moving.



20th Century Concrete Mixer



*Runs on its
own power
like an auto*

The 20th Century has 4 points of advantage:

- 1—Low Hoppers, 27" high.
- 2—Absolute proportions.
- 3—Traction.
- 4—Semi-steel castings.

The ideal machine for sidewalk, curb and gutter and street paving.

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20th Century Mixer Co.

Connerville, Ind.

Meet us at the Kansas City Cement Show, March 14 to 21.

A System of Concrete Block Construction that Absolutely Insures Dry Walls

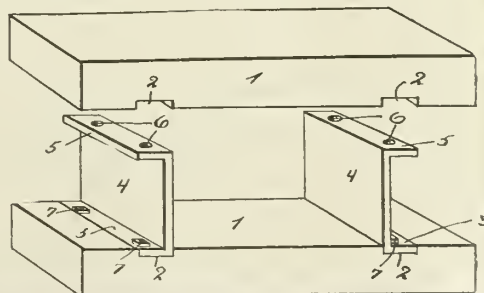
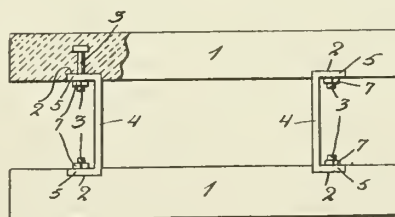
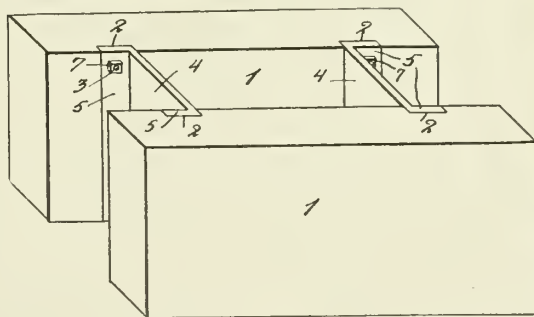
We have for sale a patent covering a System of Concrete Block Construction which overcomes the damp feature of concrete walls. It involves the manufacture of a collapsible two-piece concrete block, the sections of which are tied together by metal separators, allowing no moisture to penetrate the walls.

This block can be handled and shipped knock down and put together at any time or place, and when laid retains hollow space through the building when used. Complete information regarding this patent will be furnished reputable parties who may be interested in its exploitation. We have no machine to sell. Our patent is on the block.

John M. Crocker

Frank T. Tappan

103 East Pearl St., Coldwater, Mich.



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60 Different Colors

INVENTORS AND MAKERS OF

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"DIFFERENT FROM ALL OTHER PAINTS"

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Simmons Sectional Concrete Pile Casings

Are Carrying the Dead Loads of Buildings and the Live Roads of Railroads

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We have instances where a pile has been driven over sixty feet without losing its alignment or buckling.

They can be hammered, jacked or jetted in place. Piles of any ultimate length can be built up during the progress of driving.

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Send for circulars and prices.

We are equipped for all kinds of Special Machine Shop Work—in Piping, Columns, Railings, Roof Structures, Cold Storage, Flag Poles, Fittings, Valves, Tools and Specialties for Contractors, Engineers, Water Works and Industrial Plants.

John Simmons Co.

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Put a Slate Roof On Your Concrete Bungalow

As the strength, solidity and sightliness of concrete inspires you to build your bungalow of that material, you should and will ROOF it with SLATE for the very same reasons.

Both blend harmoniously, each emphasizes the efficiency of the other—both unite in forming structural perfection.

As the roofing for your new home, use

Sea Green and Purple ROOFING SLATE

Slate being of solid rock is the cheapest roofing because it is imperishable—so

Slate, like concrete, absolutely resists the action of air, water, fire, sun, lightning and time—is never affected by ROT or RUST; will not crack or warp. It has all the good qualities that other roofings lack—wears seven times better than galvanized iron—wears two-thirds longer than a copper roof, which costs more. Slate outlives shingles seven times and tin four times. Felt roofing, cheapest of all, has practically NO LIFE WHATEVER.

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Send for "Roofs"

This interesting little booklet contains many practical and helpful hints that show how to save money in selecting roofing material. It tells just such things about roofs that every prospective home builder ought to know about this vital question.

Write for YOUR copy today.

American Sea Green Slate Co.

(Roofs that never wear out)
170 CLARK STREET, - - - - - GRANVILLE, N. Y.

Ottawa Silica Company

Ottawa, Illinois

Largest Miners and Shippers of White Sand in the United States

Washed and Steam-Dried

White Sand

Unexcelled for

Facing Concrete Blocks, Ornamental Concrete Stone, White Plaster, Exterior Plastering, Roofing, Sawing Stone, Marble, etc.

You can order less than a carload, in fact shipments as small as five 175 lb. bags can be delivered economically

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Prices, Freight Rates and Samples on Application

"For instance, on the present job I put in 5800 sq. feet of 3 in. concrete floor in 10 hours with 8 men and same amount of 2½ in. floor with same crew in 8 hours"



Cement Machy. Supply Co.,
Denver, Colo.

Denver, Colo., Dec. 20, 1911.

Gentlemen:—I am now working on the Denver North Side Manual Training School. Have nearly 40,000 sq. ft. of floors to put in there. All mixing is done by the Coltrin Mixer which I have owned for the past two years.

The Quality of the concrete turned out by the mixer has always been satisfactory to architects and others for whom I have worked.

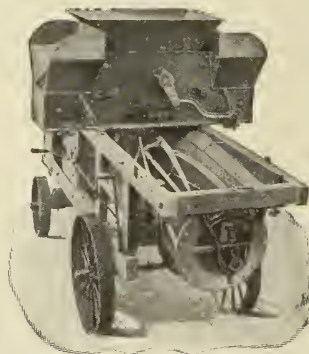
The Quantity turned out has been satisfactory to me. For instance, on the present job I put in 5,800 sq. ft. of 3-inch concrete floor in ten hours with eight men, and the same amount of 2½-inch floor with the same crew in eight hours.

Any contractor who wants a mixer and does not at same time want a bunch of trouble could do no better than buy a Coltrin.

Sincerely yours,

FRANK I. GILLINGS.

"The Quality of
concrete turned out
has always been
satisfactory to
architects."



"The Quantity of
concrete turned out
has always been
satisfactory
to me."

Coltrin Mixer with Automatic Proportioning Feed

The Coltrin Continuous-Batch Mixers

SHIPPED ANYWHERE ON FIVE DAYS' TRIAL.

STEAM—ELECTRIC—GASOLINE—STATIONARY—HAND POWER

SEE THEM AT THE

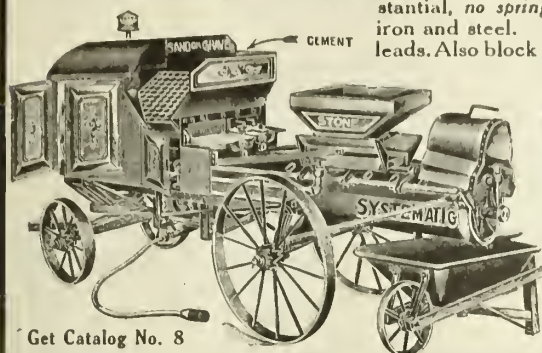
Kansas City Cement Show

WRITE FOR CATALOG.

The Knickerbocker Co., Jackson, Mich.

Systematic Concrete and Mortar Mixers

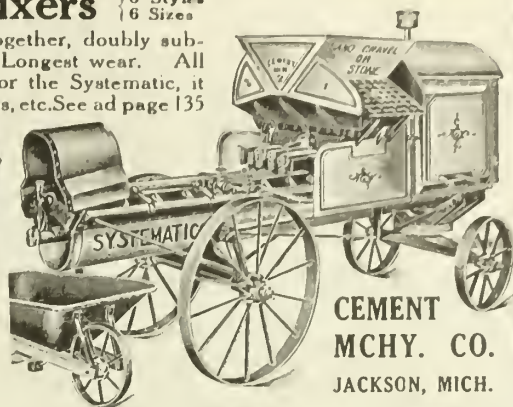
28 Exclusive advantages, per catalog No. 8—built with 2, 3 or 4 hoppers together, doubly substantial, no springs, chains or sprockets. Longest wear. All iron and steel. There's no substitute for the Systematic, it leads. Also block and brick machines, molds, etc. See ad page 135



Get Catalog No. 8



The seal of satisfaction from thousands of users



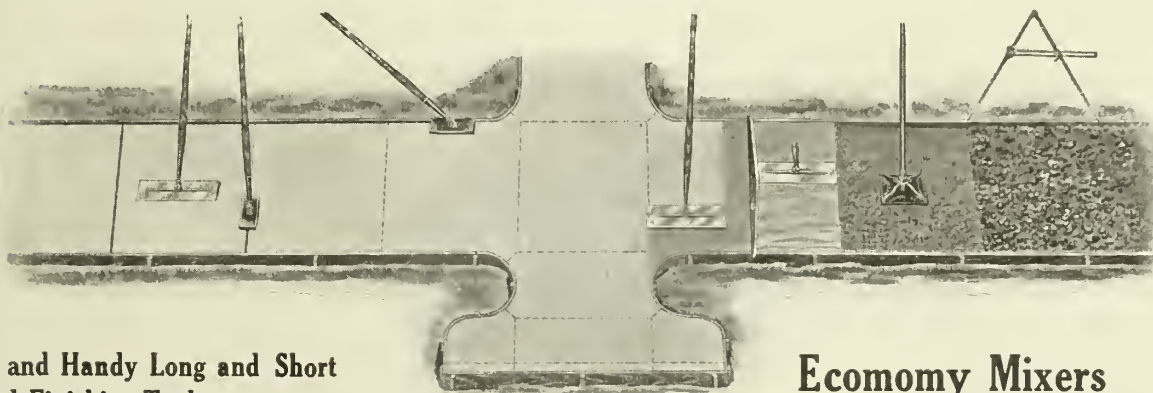
CEMENT
MCHY. CO.
JACKSON, MICH.

ATTENTION! CONCRETERS!

SIMPLE AND HANDY, LONG AND SHORT HANDLED FINISHING TOOLS. MADE IN BRONZE, IRON AND STEEL.

ECONOMY—Mixers—Block and Brick Machines—Sill, Cap and Step Molds—Tamps and Compasses. Steel Sidewalk Forms.

EVERY TOOL and MACHINE Used to Build a Sidewalk.



Simple and Handy Long and Short Handled Finishing Tools

are the Latest Improved—Simplest—Handiest—Cheapest—Best—Strongest—Most Practical—Rapid—Adjustable—SATISFACTORY.

Ask for TRIAL OFFER. Use Simple and Handy Tools in competition with any other made. If not the best, return them to us.

Kansas City Booth 56.

Economy Mixers

in all sizes to meet all demands.

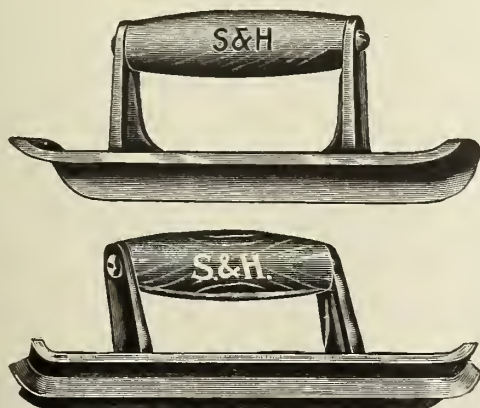
Adjustable Block Machines for all sized blocks up to 24".

Brick Machines—5—10—20 pockets. Dimension molds for all purposes.

Our Steel Sidewalk Forms are modeled for simplicity and durability.

All tools and machines fully guaranteed. Send for Catalogue.

Concrete Supply Co. Dept. C. Arrowsmith, Illinois



S. & H. TOOLS

have always been in the lead because they are the best.

Ask your Dealer for them
or send for Catalog

Smith & Holtum Manufacturing Co.

Clinton, Wisconsin

MASON SAFETY TREAD

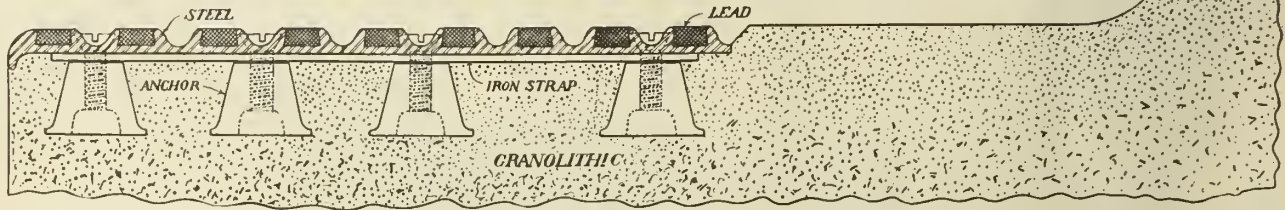
THE ONLY PERFECTLY SAFE TREAD

Should be used on all STEPS—ESPECIALLY CEMENT, also on all public floors and sidewalks. An absolute preventive against slipping on stairs, landings, inclined ways, car steps, sidewalks or any place that may become smooth. Can be fastened to anything, new or old. Will outwear any other surface. In use in every commercial center in America. Write for catalog giving full description and showing where it is in use near you.

American Mason Safety Tread Co., 704 Old South Building, Boston, Mass.

7½" WIDE WITH NOSING EDGE

MASON SAFETY TREAD



15 Days Absolutely Free Trial

You to be sole judge at the end of that time—
if you will purchase a Sanford Press Block Machine.

It is a fact that concrete blocks made by the pressure method are more dense, more uniform, with sharper corners that are as dense as the center of the block, than can possibly be made by the tamp method.

This means more profits.

It is a fact that in the saving of labor cost alone you can pay for a Sanford Press in six months' time, to say nothing about the better quality of block that you turn out.

This means more profits.

It is a fact that you can double your output on a Sanford Press with the same amount of labor cost. You will have no trouble in securing men because the work is easier, and your blocks at the end of the day have the same density as the first block made in the morning. This means more profits.

This machine is interchangeable and can be adjusted to make blocks from 4 to 24" in length, 6 and 8" height of face, 4, 6, 8, 10 and 12" thickness of wall; fractional parts to full capacity of the machine are made at one operation, and any

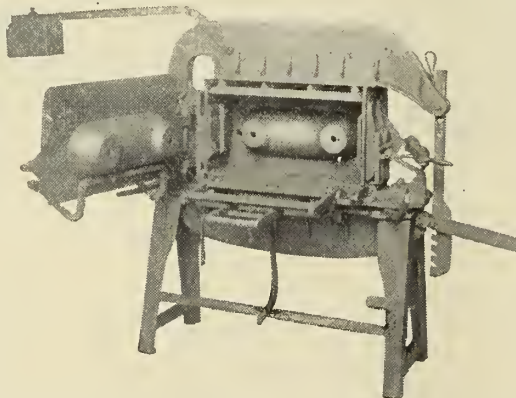
face design that may be desired.

You can make any curve or angle block, header bond two-piece system, metal tie two-piece system, slab or veneer block, hollow block, with vertical and horizontal air space, silos, water tables, etc.

You can face your block on one or all four sides at one operation of the machine. In fact, you can make anything that is ordinarily required in building construction.

It is absolutely the only down-faced hollow block pressure machine on the market, and is protected by

broad basic patents.



**SEND FOR
MIXER PROPOSITION**

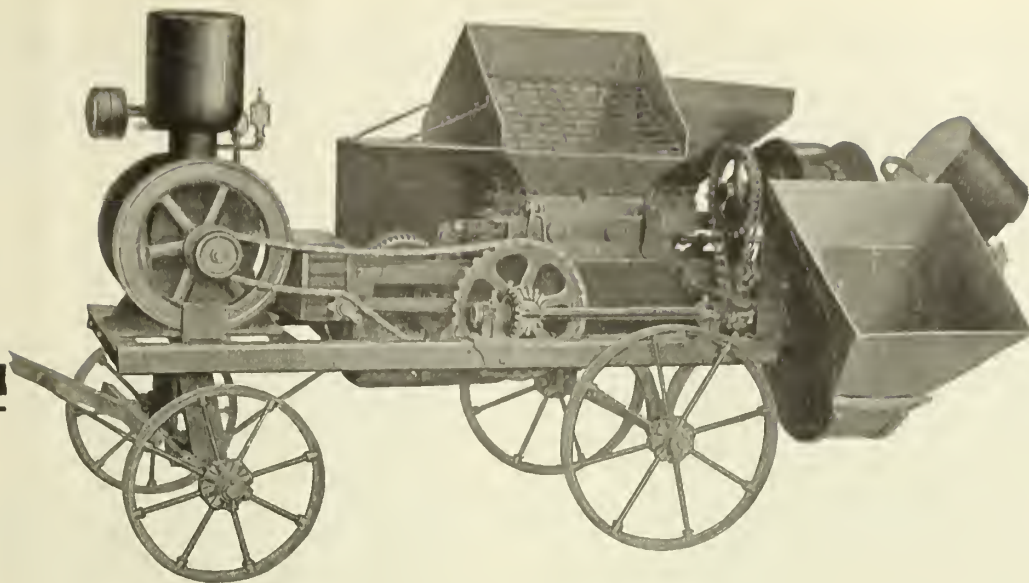
You take no risk—just say the word and a "Sanford" will be placed in your plant to be tested out to your own satisfaction for 15 DAYS.

ABSOLUTELY FREE TRIAL

You are under no obligation at the end of the free trial—if you can fairly say that the "Sanford" does not turn out a better block and more of them—you send it back.

Think of that. Write today and get full information on the GREATEST BLOCK MACHINE offer ever made. Send us your name and address and we will send you a proposition that will certainly open your eyes. Be on the safe side and write us NOW. There is not a better machine made at any price. Don't wait—do it now while you think about it.

The Sanford Concrete Machinery Company
TOLEDO, OHIO



U. S. Standard Senior B. Concrete Mixer

This type of the well known U. S. Standard Self-Proportioning Continuous Mixers is a three-hopper machine designed for general contract work. It accurately proportions cement, sand and gravel or stone up to $2\frac{1}{2}$ in. in diameter, and feeds these materials positively. Capacity, 90 to 100 yards per day. Note the low down stone hopper.

Special types for all kinds of concrete work. Ask about our Block Plant Mixer, mounted on steel base.

Get Our Catalog

Our new catalog D will save money for you. Lists continuous mixers and face-down block machines.

Write for a copy today.

The Ashland Steel Range & Mfg. Co.

MANUFACTURERS OF

U. S. Standard Concrete Machinery

ASHLAND, OHIO.

U. S. Standard Face- Down Block Machine

One of the oldest face-down machines on the market. From four to six oval cores in each block, cutting down material costs without weakening the block. Use wetter mixture than with other machines.

If you are in the market for a block machine, write for full information about the U. S. Standard.

TAKE OUR WORD FOR IT

THE MOST PERFECT BARROW FOR HANDLING LIQUID CONCRETE, SAND, GRAVEL AND BROKEN STONE

ORDER A TRIAL LOT ON OUR SAY SO

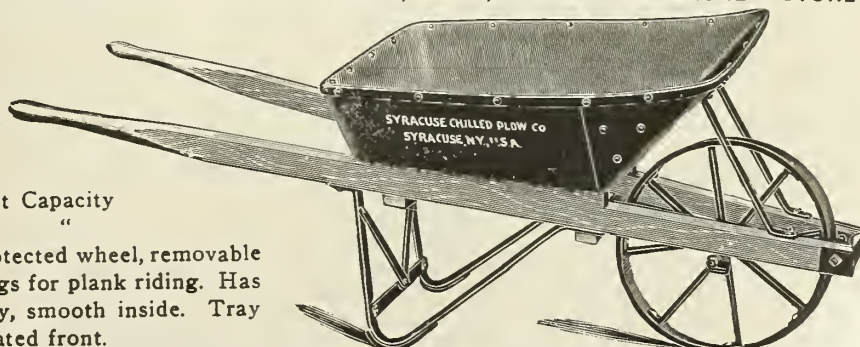
After that you will never be in doubt
as to what Barrow to buy

No. 75-A $3\frac{1}{2}$ Cubic Feet Capacity

No. 79-A 4 " " "

Is an end dumping Barrow, has protected wheel, removable shoes on legs, cross bar between legs for plank riding. Has an extra strong strapped steel tray, smooth inside. Tray placed well forward and with elevated front.

SYRACUSE CHILLED PLOW COMPANY, SYRACUSE, N. Y.



Labor is the Big Cost Item—How to Cut it Down

Whether you do general contracting work or operate a concrete plant, if you can cut down your crew by one man, it means about \$800 a year to you.

You can cut your labor costs by using labor-saving equipment—cars, barrows and trucks for handling raw material and finished product.

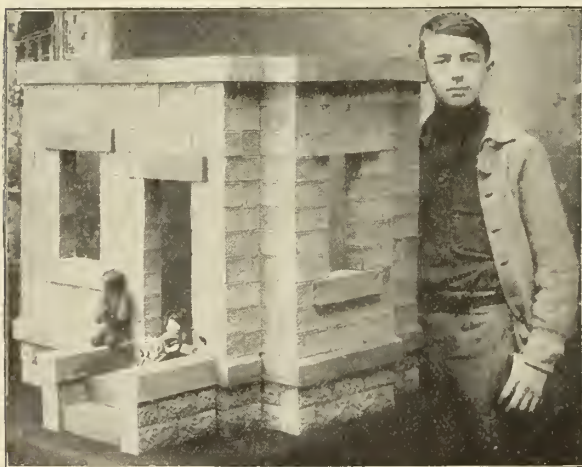
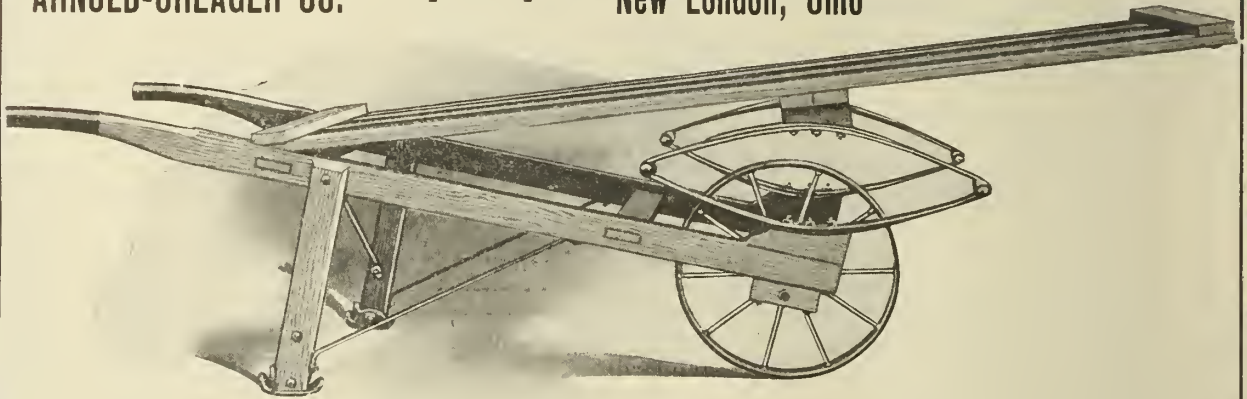
We manufacture a special line of trucks, cars and barrows for concrete men. We make barrows for sand, cement, gravel and mixed concrete—special spring barrows for green concrete products—barrows for pallets and face-plates—carts for materials—trucks for handling the cured product.

We show below our special two-wheeled spring barrow for handling green block, brick or tile in the plant. The same barrow is made with two wheels if desired.

Write for our big catalog of carts, barrows and trucks. Such equipment is not expensive and it saves money.

ARNOLD-CREAGER CO.

New London, Ohio



SOMETHING FINE FOR YOUR BOY AND FOR YOURSELF ALSO

The cut shows a Doll's House the boy has built for his sister, using real hollow cement blocks, made by himself in the **SIMPSON JUNIOR CEMENT BUILDING BLOCK OUTFIT**. This is only one of scores of houses of all kinds that he can build—a work shop for himself, a chicken coop, a dog kennel, an enclosure for a garbage can, models of residences, schools, churches, stores, etc. Notice the rock face foundation blocks, the bush hammer range blocks, the panel face blocks, the water table, cornices, copings, steps, window and door sills and caps. The Junior Outfit produces them all. This is the latest addition to the list of

SIMPSON MOLDS

It has wonderful possibilities and is the greatest educational toy a boy ever had—but it is very much more than a toy. The price is **THREE DOLLARS**, by express, charges prepaid to any point in the United States. We have a special circular telling all about it which we would like to send you.

But this is only one small feature of our business, which is chiefly the manufacture of molds for

Porch Trimmings, Garden Furniture and other Ornamental Work

OUR CATALOGUE IS THE GREATEST IN THIS LINE EVER ISSUED. CONTAINING A GREAT NUMBER OF SPECIAL HALF-TONE ENGRAVINGS OF FINISHED PORCHES AND OTHER STRUCTURES. SEND FOR IT, USING YOUR BUSINESS STATIONERY OR ENCLOSING YOUR BUSINESS CARD.

THE SIMPSON CEMENT MOLD CO.

101 VINE ST., COLUMBUS, OHIO.

In writing Advertisers please mention CONCRETE.

THE PERFECT

See it
at the
Kansas
City
Cement
Show



BRICK MACHINE

The Brick Machine that pleases everybody. The 1912 Model with its valuable improvements has no equal or comparison in Value, in Simplicity, Durability or Speed. Investigate the make-up of the PERFECT before purchasing any other.

Write for Catalogue and Prices.

C. S. WERT

Kendallville, Ind.



Get at the Heart

Of the
Sidewalk Form Proposition.

INVESTIGATE HELTZEL SYSTEM STEEL FORMS

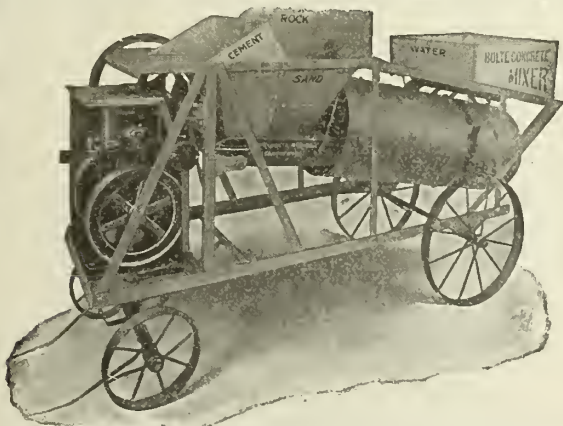
For economic and simple cement sidewalk, curb and gutter construction there is none as good.

Write for Booklet.

See Exhibit at Chicago Cement Show, Space 41.

W. B. JONES BOILER CO.

S Street, Streator Co., Streator, Ill.



All who contemplate purchasing a concrete mixer, should investigate a "BOLTE." WHY? Because they are the best all purpose mixer for the price on the market. Hundreds are in use giving entire satisfaction.

If in the market for Block or Brick machines, Power Tamper, Gasoline Engine, Sidewalk, Culvert or Bridge Forms, Finishing Tools, Wheelbarrows, Steel Facing or Mortar Box—

Ask for our No. 12 Catalog, stating what you are in need of. Let us quote you Prices and Terms!

THE BOLTE MFG. CO.

Kearney, Nebr.

Machinery and Supplies

¶ If you don't see what you want advertised, ask us about it. We can tell you where to get it and what it will cost.

Buyers and Sellers Dept.

Concrete Pub. Co., Detroit, Mich.

THERE'S A REASON WHY

**No. 60, Cement Waterproofing and Bonding,
Des Moines Elaterite**

Is superior to every other waterproofing and bonding material.



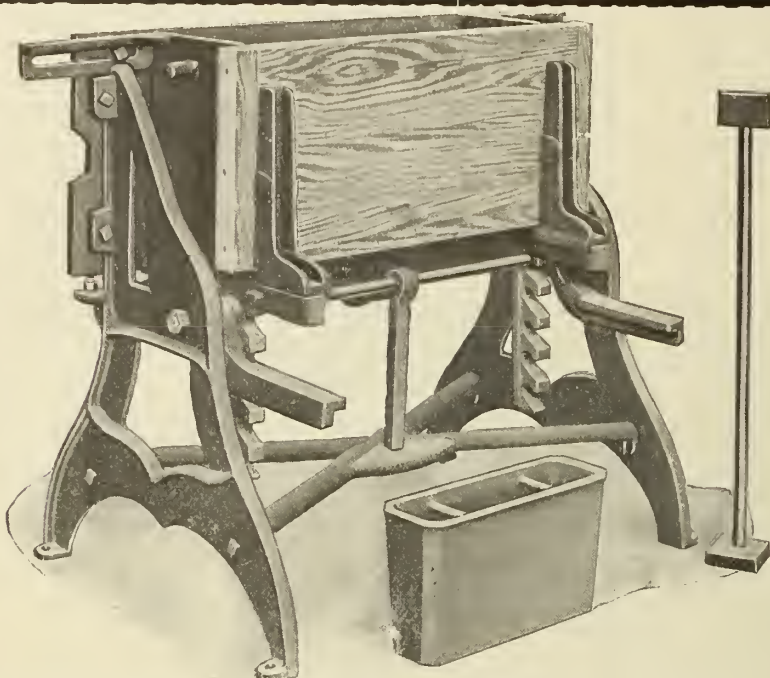
It's the natural characteristics of the rubbery pigment—intensely adhesive, bonding quality, resistance to all acids, absolutely waterproof character, permanent elasticity.

Recent tests showed adhesive, bonding strength equal to 160 lbs. per square inch, giving a permanency and a resistance to water pressure not found in any other waterproofing material.

Plaster coats are applied directly over it, the adhesive, bonding strength holding them firmly and permanently. (See cut.)

Catalogue "W" with full information on request.

THE ELATERITE PAINT & MFG. CO., DES MOINES, IOWA



The illustration shows my Adjustable Down-Face Block Machine. It will make blocks 16", 20" and 24" long; solid, 4" and 6" wide; hollow, 8", 10" and 12" wide. Not a small bolt or nut in it. Plates and doors changeable in a minute's time. Built solid. Many styles of face-plates. Price, complete, \$100.00.

Another very popular machine is for blocks 16" long or under, 4" and 6" wide solid blocks and 8", 10", and 12" hollow blocks. With this machine a man can buy the 8" machine and later add the 10" or 12" parts. I am going to make the price of this machine \$75.00.

SPECIAL OFFER

I have on hand 12 machines which will make blocks 8 x 8 x 16 in. These machines are similar in design to my others. I make a special offer to clean them up. Price, while they last..... **\$32.00**

You can always get repair parts for these from me—but I build 'em generally so they won't need repairs.

I HAVE been making concrete block machines for seven years. I run a foundry here in Jackson. Ask anybody about town what kind of a man I am—you'll get a report that will convince you that you can bank on what I say.

I've perfected a common, everyday block machine that will make a wider range of block, faster and cheaper, than any machine on the market within speaking distance of the price of mine.

My machine is built heavy. It will stand the racket. I make the castings in my own foundry and machine them in my own shop. I charge a fair price for the machine—no fancy patent royalties, no extras—just a fair profit on the work and the pig iron.

If you want an honest block machine at a reasonable price, drop me a card. My catalog is not much on expensive illustrations, but it's there with the interesting details.

Write me tonight.

Wm. Cobb

Foundry

209 Clinton St., Jackson, Mich.



Send for Descriptive
Booklet NOW

Making ready to insert the floor beams.

Van Guilder Hollow Wall Concrete Machine--- Continuous Air Chamber from Cellar to Roof

Steel Reinforced Throughout

Completely revolutionizing building methods.

We manufacture and build with one operation; saving manufacturers' profits, transportation charges and half the labor cost, producing a more durable and up-to-date building. Only one machine needed for each job.

Van Guilder Houses Cost Less than Wood and Sell
Quick at a Wonderful Advance

They have stood the test for over four years and are long past the experimental stage.

This superior construction was immediately approved by the building department of the city of New York, one of the most severe and conservative boards in the world.

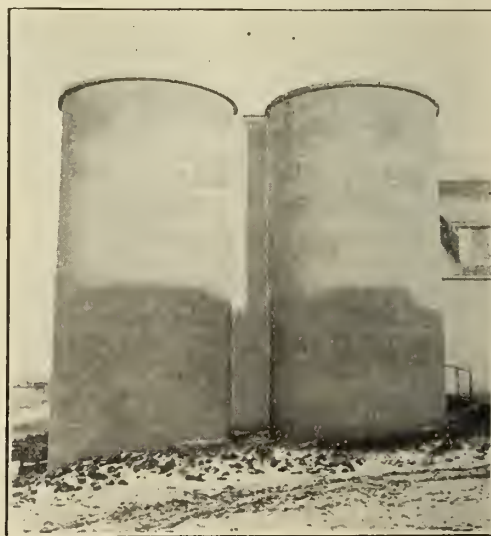
SILO WALLS

Our curved silo machine produces a silo which is waterproof and frostproof, greatly improving the quality of the ensilage. The most economical and durable construction in the world.

Van Guilder Hollow Wall Company

728 Chamber of Commerce Bldg.

Rochester, N. Y.



P—G—P

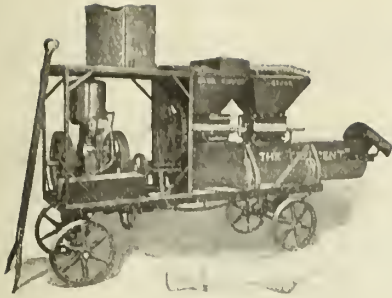
To do a difficult thing with ease is a marvelous achievement.
To do an extremely difficult thing with amazing ease is still more marvelous.

To erect circular concrete stand pipes, smoke stacks, grain storages, silos in a little of no time with absolutely flawless alignment, is an achievement that is made marvelously simple only by the Polk System. [pat.]

If you want to know about an offer that means money and business to you, you had better obey the impulse to send for particulars.

Polk-Genung-Polk Company, Inc.

Fort Branch, Indiana



Showing Mixer With Stone Hopper

How Your Neighbor Makes Money

YOU profit by the experience of others, or, in other words, we profit by the experience of *each other*. For instance—if John Jones is putting money in the bank by making cement tile and brick, don't you stand the same chance? And if Sam Brown is cleaning up a bunch of money by using an up-to-the-minute mixer, what's keeping you from doing the same thing? Take an inventory of yourself, and then let us tell you how John Jones and Sam Brown are doing it with

"Crescent" Continuous Concrete Mixers—The simplest, strongest, most practical and handy mixers on the market. Proportions wet and dry materials accurately, and mixes thoroughly. The price is low. Every cement worker should have one. We guarantee it.

"Crescent" Sewer Pipe and Tile Molds—Used the world over, and by Uncle Sam in his reclamation work. All sizes 4" to 48". Bell-up or bell-down on same mold, with or without pallets. We employ over 500 patterns in making pipe and tile molds alone. We can explain every "in and out" of this business.

"Crescent" Vertical Tamping Brick Machines—The only practical and scientifically correct machine on the market. Our 1912 model has a big feature that revolutionizes brick machines—the combined hopper, stripper and finisher, combined and patent facing plate. You will want it if you see it.

"Crescent" Power Tile Machines—To make tile 3" to 10". The price is very low. This machine alone is a big profit producer. Can be operated by one man. Utmost strength. Exclusive features.

We Will Exhibit at

Kansas City Show, Mar. 14-21, Booth 70

SEND THIS NOW →

Raber & Lang Mfg. Co.
802 Mill St. Kendallville, Ind.

Fill Out and Send to Us

Raber & Lang Mfg. Co., **C**
Kendallville, Ind.,

Please send prices and free literature on the following:

☐ Mixers ☐ Tile Molds ☐ Brick Machine ☐ Power Tile Machine

Name
Address



"Crescent" Sewer Pipe Mold

Proof That NATIONAL MIXERS Make Good

R. T. Ford Co., General Contractors,
Purchased a National Mixer in 1907
Purchased another National Mixer in 1909,
Purchased another National Mixer in 1911,
Using all of them on New York State work.

Send for Catalogue C.
NATIONAL MIXER CO.,
641 Mercantile Bldg., Rochester, N. Y.



HESS MEDICINE LOCKER

The Only Modern, Sanitary STEEL Medicine Cabinet

or locker, finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimmings. Steel or glass shelves.

Costs Less Than Wood

Never warps, shrinks, nor swells. Dust and vermin proof, easily cleaned.

Should Be in Every Bath Room

The Recessed Steel Medicine Cabinet

For styles—four sizes. To recess in wall or to hang outside. Send for illustrated circular.

HESS, 902L Tacoma Bldg. CHICAGO

Makers of Steel Furnaces.

Free Booklet.



The Outside Steel Cabinet

Men pooh, pooh, sometimes, at "Book Learning." A man's own experience certainly is the best teacher. But a man's own experience doesn't contain enough to be all-sufficient. He must know what experience other men have had. The knowledge of other men's experiences is to be found in books. Practically every book of value to the concrete worker is listed in a catalog which will be sent to you by the **CONCRETE PUBLISHING COMPANY**, 97 Fort Street West, Detroit, Michigan, merely for the asking.

Take Fifteen Days Trial

And See For Yourself

We want every prospective customer to understand that the only way we have ever sold our machines or ever will sell them, is subject to Fifteen Days' Free Trial by the customer before he finally decides whether he will keep it or not. We don't consider a sale closed simply because you have ordered the machine, but only when you have tried it out for yourself and have seen what it will do.

Dunn Drain Tile Machine

You can take it from the crate, set it up and operate it yourself from printed instructions. No need for us to send experts—none are required. Test it out thoroughly. Make tile on it for two weeks before you accept it.

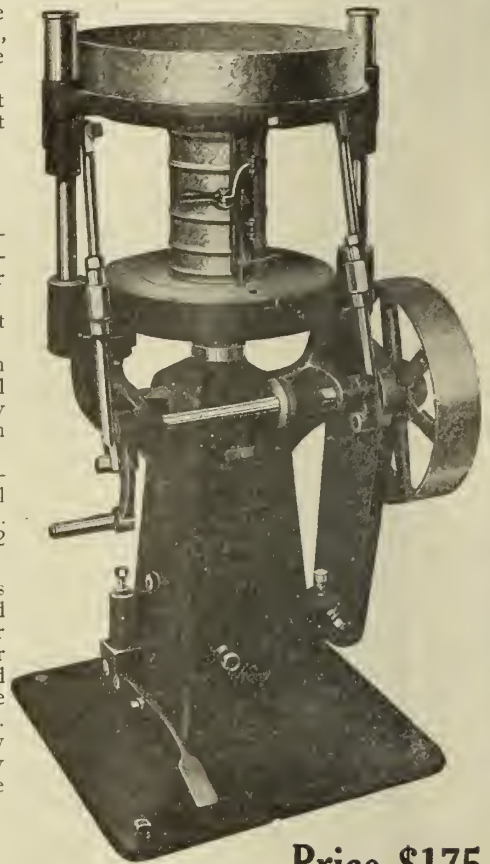
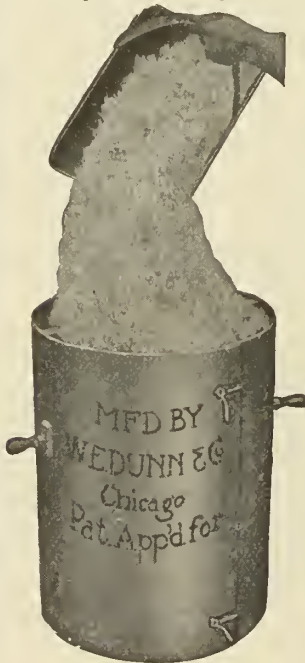
If you start with this machine, your investment is small; but as your demand increases—add another machine.

You don't require a large force of men, because one man with material mixed will turn out 1,000 tile per day. Two men will double this output. The profit in making tile for your vicinity will soon pay for one of these machines. One man made enough money in twelve days to pay for his.

It is built on the only correct principle. Broad solid base—cast in one piece. All main bearings have bronze journals. All the simple, necessary machinery is enclosed in the dust-proof base.

It makes all size tile from 3 to 12 inches and makes them perfect.

Send for big catalogue. It gives prices of all the machinery listed and tells you what you may expect for your money. This catalogue is our only salesman. Whatever is claimed for machinery in this catalogue, we stand back of it with a guarantee. Whether you are ready to order now or not, we want you to have a copy of our big catalogue. Write for one now; a postal will do.



Price \$175

Poured Sewer Pipe Molds

No tamping with these molds. You mix the concrete wet and pour it into the molds. The result is a dense, firm pipe that will ring when you strike it with a hammer. This is very important when the pipe are to be used for sewers or road culverts.

In case you want to make a dry tamped pipe, you can do it just as easily. The stability of our core form and the positive locking device on the outer shell insures a product of uniform shape and thickness.

These molds are made in all sizes from 6 to 36 inches in diameter.

Send for catalogue on these pipe molds. It devotes many pages to them. It not only tells a great deal about the molds themselves, but tells the most advantageous way to handle the product. Send for this book today.

Dunn Combination Block Machine

You won't find a simpler, better block machine anywhere. It makes blocks from a wet mixture because the newly made block is protected by the mold in turning and off-bearing. You know, this enables you to make a denser, and more waterproof block, than with the usual semi-dry method.

It makes blocks in widths of 8, 10 and 12 inches; all on the one size wood pallet. It makes veneer and two-piece wall blocks in widths of 2, 3 and 4 inches, two in one operation.

It is a simple, practical machine, that will make all blocks used in ordinary building construction.

Send for a catalogue.

Price \$40.00

W. E. Dunn Mfg. Co.

4134 FILLMORE ST. - - - - - CHICAGO



Save 20% to 50% on Concrete Machinery

Wholesale Prices

On Anything Needed For
Concrete Work



The largest factory in the world devoted to the manufacturing of concrete machinery.

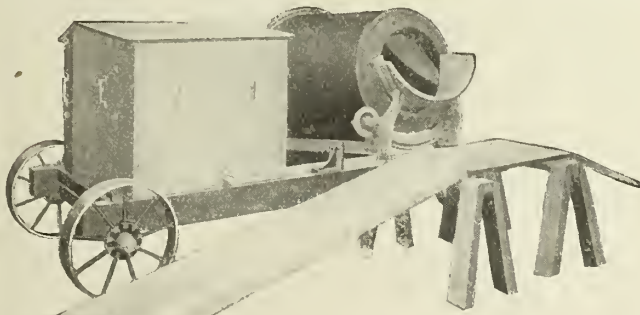
We are the biggest concrete machinery builders in the world. With a big output of all kinds of concrete machinery, appliances, accessories—everything used in concrete work; with all facilities of our own brass and machine shops, foundries, pattern work, including gasoline engine works, etc., we reduce costs of production to a minimum. We save you from 15 to 50 per cent on everything in the concrete machinery line. Our big facilities and big stock enable us to quote low prices and make immediate delivery. All machinery sold on guarantee with 10 day return privilege at our expense.

Block Machines, \$10 to \$250; Brick Machines, \$22 to \$75; Mixers, \$24 to \$1,000; Porch Column and Baluster Outfits, \$15 to \$75; Cap and Sill Moulds, \$12 to \$35; Lawn Vases, \$15 to \$25; Ball Moulds, \$2 to \$17; Grave Stone Moulds, \$7 to \$69; Well Curbing Moulds, \$4 to \$7; Drain and Sewer Tile Moulds, \$6 to \$83; Block Cars, \$11 to \$17; Fence Post Moulds, \$7 to \$12; Silo Moulds, \$14 to \$150; Coping Moulds, \$18; Jardinieres, \$12; Special Gate Post Moulds, \$10 to \$30; Newel Post Moulds, \$14; Grave Markers, \$7; Burial Vaults, \$90.

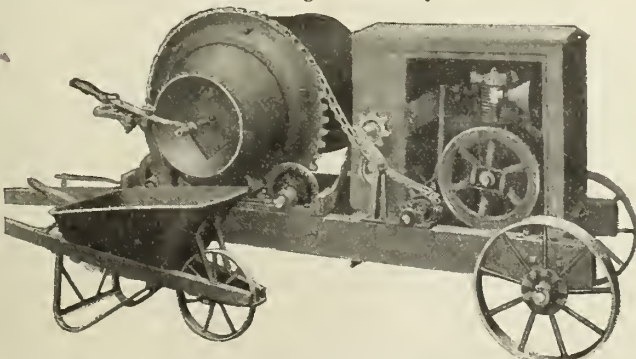
Also complete line of Cinder Crushers, Rock Crushers, Sand and Gravel Elevators, Sand Screens in both revolving and Stationary Type, Mortar Gauges, Wheelbarrows, Jointers, Groovers, Edgers, Corner Tools, Curb and Gutter Tools, Corrugating and Radius Tools, Roller Jointers, Brick Tongs, Curb Clamps, Curbing Edgers, Hawks, Floats, Line and Indentation Rollers, Tampers, Rammers, Name Stamps, Indentation Letters, Wall Plugs, Expanded Metal and Water Proofing, Flower Pots, Etc.

Catalogs. Advise us what machine or mould you are interested in. Any or all our catalogs sent free on request.

NORTHWESTERN CONCRETE MACHINERY and TOOLS



Intake Showing Accessibility.



Discharge Side Closed. Any Amount of Mix Can Be Released from a Shovelfull to a Cartload.

Our Cone Batch Mixer

The low intake of this mixer saves from \$60 to \$100 per month in labor cost alone. The price is considerably less than other standard high grade mixers and the speed in mixing is so great that you can use a smaller size of this type with capacity per day equal to other larger size machines, two features alone which will save you at least half the cost of your mixer equipment. This is the only mixer that combines the principles of cone, cube and polygon shapes with the inside shifting and scattering of materials by paddles and scoops, adjustable for wet and dry mixes and all kinds of work. The paddles are attached to rods instead of the shell, a self-cleaning machine with no pockets for cement to collect in. The low waist-high intake allows several men to charge by shoveling, or to fill with wheelbarrows from a 28-inch platform. Intake is open, showing mix at all times; slopping eliminated. Discharging device shoots any quantity from shovel to cartload into the highest wheelbarrow or directly into moulds. Mixes a batch in 20 to 30 seconds. Built in all sizes from 7 ft. up—steam, gasoline or electric motor power.

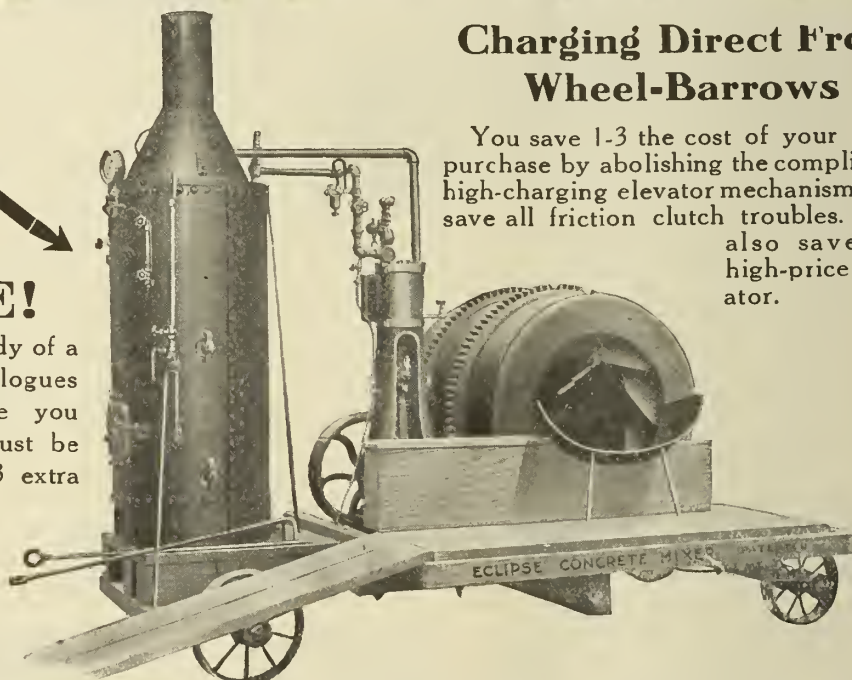
These catalogs show and describe in detail the full line of Northwestern Mixers—Sidewalk, Contractor's, Block Plant Mixers, Continuous Mixers, Elevators, Hand Mixers, etc., and Complete Line of Concrete Machinery of every description. State what you are interested in and get the catalog covering the subject.

Northwestern Steel & Iron Works,
1021 Spring St., Eau Claire, Wis.

33¹/₃% ALREADY SAVED ON YOUR CONCRETE-MIXER PURCHASE Before You Read This Adv.

NOTICE!

A few moments study of a collection of catalogues will soon convince you that other mixers must be "equipped" (at 1-3 extra cost) with an unnecessary high charging apparatus.



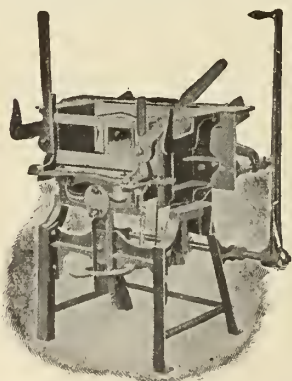
Charging Direct From Wheel-Barrows

You save 1-3 the cost of your mixer purchase by abolishing the complicated high-charging elevator mechanism. You save all friction clutch troubles. You also save the high-price operator.

Charging Platform Low Ready For Immediate Use

"The Standard" Concrete Mixer

Eclipse Stone Machine



Write for Catalog No. 136 for Full Information and Prices

Every feature of "The Standard" has been as carefully planned and tested by our engineers as the modern automobile manufacturer plans the auto-economy-construction-output and compactness prevailing.

"The Standard" Concrete Mixer has been designed to meet the requirements of

The Large and Small Contractor Alike

Always Reliable for the Large Contract and Always Ready for the Small

Simple in Operation and durable in construction together with its efficiency and cost has made it the most popular in the world

SEND FOR CATALOGUE NO. 36 FOR FURTHER INFORMATION.

The Standard Scale & Supply Co.

Chicago
1345-1347 Wabash Ave.

Pittsburg
243-245 Water St.

Philadelphia
35 South Fourth St.

New York
136 West Broadway

A Continuous Steel Concreting Surface

forms a part of the rigid and simple reinforcement of this ideal sidewalk light construction. Steel ribbed forms of span lengths interlock at sides. Holes in top receive glasses, which bear on all four sides of hole and center themselves. Steel rods are then run both ways between glasses to provide additional strength.

BERGER'S *Raydiant* SIDEWALK LIGHTS

require no wooden forms—save time and labor—give the greatest lighting surface—can be equipped with glasses for every requirement—are economical to the contractor as well as the owner—form the most efficient and strongest sidewalk light construction made—and make a poor job impossible.

Write for "Raydiant"—it describes what a safe sidewalk light construction should be.

The Berger Mfg. Co.

New York
Boston
Philadelphia
Atlanta

CANTON,
OHIO

Chicago
St. Louis
Minneapolis
San Francisco

Also manufacturers of Concrete Sidewalk Forms, Rib-Truss, Ferro-Lithic and Multiplex Reinforcing Plates, Metal Lumber, Expanded Metal Lath, Prong Lock Studs and Furring, etc.

Make Lower Bids—And Higher Profits BY USING OUR LONG HANDLED FINISHING TOOLS

One finisher can do several times as much work in a day as he can with hand tools; smoother work, too. Tools are equipped with long handles to enable operator remain standing at his work. Saves backaches and sore knees. Finisher trowels backward and forward across the walk. All the work may be performed from one side of the walk. Our patent device automatically tilts the edge of the trowel blade to prevent digging into the mortar.

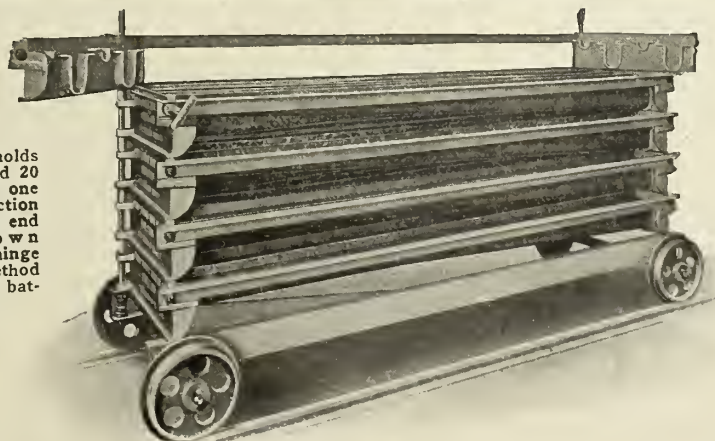
SENT ON FREE TRIAL—No Cash in Advance

Any tool or complete set sent to any responsible contractor on 10 days' trial. No cash in advance. Try them on your own work before paying for them. We make trowels, jointers, edgers, floats, etc.

Free catalogue mailed on request—send in your postal today. Address

Twentieth Century Manufacturing Co.,

1650 LOWE ST., - - - CHICAGO HEIGHTS, ILL.



Batteries of molds making 30 and 20 wet posts at one time. Top section emptied and end frames thrown back on hinge showing method of emptying battery.

CONCRETE FENCE POSTS

T-Shape makes them
Strongest—Lightest—Cheapest

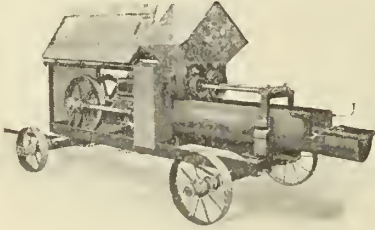
Our molds and posts are used all over the world. Used by leading U. S. railroads and interurbans. We guarantee our molds absolutely. See our exhibit at the Kansas City Cement Show, March 14-21.

OHIO POST MOLD CO.

1341 Nicholas Bldg., Toledo, O.
Write for our catalog.

TRY A PERFECTION FREE—FOR TEN DAYS

Here is the clause of satisfaction that we put in every Perfection contract "If, after ten days' good hard use and abuse, the mixer does not meet your requirements, you are to return the machine and we will pay the freight both ways."

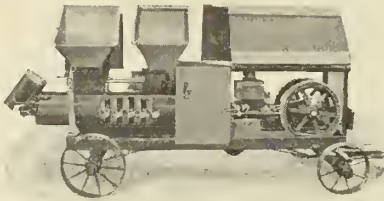


NUMBER ONE—MODEL A

Machine on skids for factory use. Capable of mixing from forty to fifty yards per day, **\$175**

NUMBER ONE—MODEL B

Machine mounted on truck with three and one-half horse power Novo Engine, capacity forty to fifty yards per day **\$300**

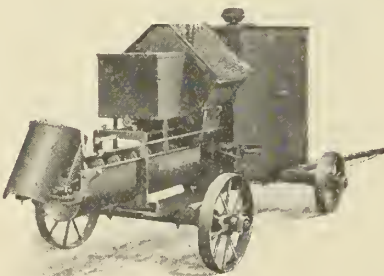


NUMBER TWO—MODEL A

Machine on skids for factory use. Capable of mixing from sixty to seventy-five yards per day **\$250**

NUMBER TWO—MODEL B

Machine mounted on trucks with four and one-half horse power engine, capacity sixty to seventy-five yards per day **\$400**



If desired, we can furnish stone attachment for Number 2 Models at an additional cost of thirty-five dollars.

SEND FOR OUR CATALOG

THE CEMENT TILE MCHY. CO.
WATERLOO, IOWA

THE 4 WAY Block Machine

A complete machine for making face-down core blocks; side-face core blocks; face-down continuous air space blocks and side-face continuous air space blocks.

Our catalog tells the story and will be mailed free—write right now.

The Cement Tile Machinery Co., Waterloo, Iowa.

THIS SANATORIUM

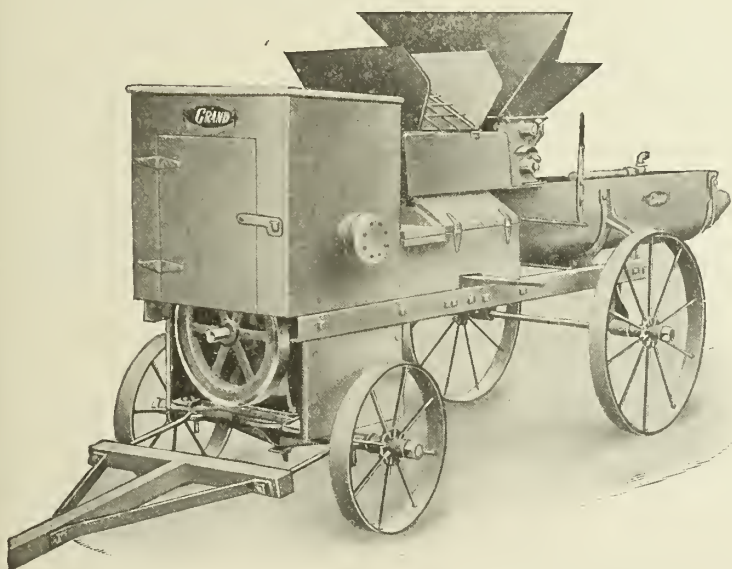


THE SAWYER SANATORIUM
WHITE OAKS FARM
MARION, OHIO.

is one of the most modern in the country. It contains a lot of good concrete construction. Every cubic foot of concrete used was mixed in a Baby Grand Mixer. The officials are convinced that every atom of concrete was mixed right up to standard. They know that the mixing was done rapidly and at low cost. There were no troublesome delays. The Baby Grand did it.

THE "BABY GRAND" MIXER

"NOT A PIANO, BUT IT RUNS LIKE ONE"



For the general contractor or the concrete block manufacturer, with work inside or outside, the Baby Grand is a mixer that will make money. Read what the Sawyer Sanitarium officials say:

THE SAWYER SANATORIUM
White Oaks Farm
Marion, Ohio.

Marion, O., Jan. 26, 1912.

Hall Holmes Mfg. Co.,
228 Oak St.,
Jackson, Mich.

Gentlemen:—I wish to say that it affords us great pleasure to commend your Concrete Mixer. We used one of your junior machines in the construction of our new plant and found it in every way satisfactory, a great labor and time and money saver in any construction dealing with concrete.

Awaiting your further commands, we are,

Very truly yours,

(Signed) DRS. C. E. & CARL W. SAWYER.

We manufacture the Grand Mixer in larger sizes. Before buying a mixer for any purpose, get our big illustrated mixer catalog.

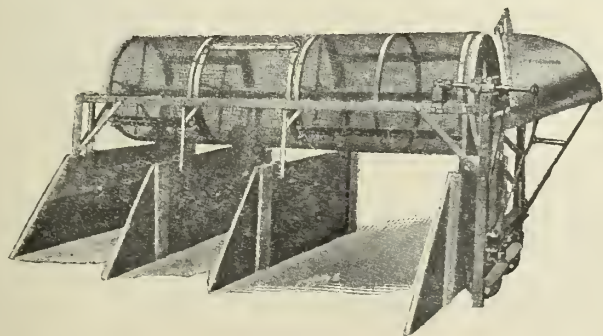
Hall-Holmes Mfg. Co.

229 Oak Street
JACKSON, MICHIGAN

Improved Converse Rotary Screen

Turned by Hand or Power

For Sand, Gravel, Crushed Stone, Coal Screenings, Etc.
Any Number of Sizes Separated at One Operation



Each section is made of two half sections, attached to the cylinder by only six bolts, so they may be easily changed to those having other spaces.

The sections are made in exact sizes and are interchangeable.

If by trial, sections of different spaces between wires are wanted, we exchange.

The casters are a great convenience when it is not desired to locate the screen in a permanent place.

The partitions are removable by turning the turn buttons on the posts.

Purchaser makes partitions from any rough boards.

To run by power remove the crank and substitute pulley.

Crank is located at feed end at a comfortable height enabling one man to operate, if desired, by alternately filling hopper and turning crank. Chain transmits the motion from a small sprocket on crank-shaft to a larger sprocket on main shaft, thus taking less power.

We can furnish these screens with electric motor mounted on the screen frame. Prices and further data on application. Send for our approval offer.

Patents pending on the original features of all our Rotary Screens

F. S. Converse, 101 Chestnut St., Binghamton, N. Y.

Liner Advertisements

Notes for these columns: Three cents per word per insertion, payable in advance. Copy can be accepted as late as the First of any month for that issue.

HELP WANTED

WANTED—FINISHER FOR PAVE-ments, floors, stucco, etc. Address, stating age, experience, wages desired, etc., Box 106, c/o Concrete Publishing Co., Detroit, Mich.

BUSINESS OPPORTUNITIES

RETAIL LUMBER BUSINESS. YARDS and Mill in growing town, with Branch Yard in an adjoining town. Only yards in this territory. In heart of Eastern Coal Fields. A First-class Business—a money maker. Good reasons for selling. Address, Retail Yards, c/o Concrete Publishing Co., Detroit, Mich.

FOR SALE OR TRADE—COMPLETE Concrete Tile and Block Plant, boiler, engine, piping, shafting, Schenck Tile Machine, Kramer Tamper, 4 block machines and pallets, small tools and accessories, 2 mixers; building 60x100. Good yard on sidetrack with sand close. Trade established and paying, but owners interested in other lines and wish to sell to practical man. \$14,000 plant will be sold cheap. Box 263, Ottumwa, Iowa.

POSITIONS WANTED

POSITION WANTED—BY MAN EX-perienced in high class concrete work—reinforced, ornamental, cast stone, sand, plaster and glue mold work. Address Box 111, care of "CONCRETE," Detroit, Mich.

WANTED BY APRIL—POSITION TO operate block machine—"Ideal" preferred—in New England if possible, but other places considered. Four years' experience, steady and reliable. Box 108, Concrete Publishing Co., Detroit, Mich.

DEXTER

Portland Cement
THE NEW STANDARD

Sole Agents **SAMUEL H. FRENCH & CO.** Philadelphia



FOR SALE—Miscellaneous

MAKE A GOOD BLOCK MACHINE FOR about fifty cents. Illustrated Directions One Dollar. Have for sale the best brick and block machines cheap. William Barten, Gordon, Nebraska.

FOR SALE—Concrete Machinery

SACRIFICE SALE — 1 TEN INCH Ideal block machine, three hundred pallets; 2 Home Builder eight inch block machines; 1 Snell mixer. Box 110, Concrete Publishing Co., Detroit, Mich.

BLOCK MACHINES FOR BUILDING Double Wall Frost Proof Concrete Silos. Address, J. J. Coyne, Fond du Lac, Wis.

FOR SALE—U. S. CEMENT BLOCK Machine. Address Den Adel & Van der Heiden, Pella, Iowa.

FOR SALE—WRITE WETTLAUER Bros., Buffalo, N. Y., for their Catalog with new plan of selling at bottom prices on Mixers and Brick Machines.

HAVE YOU RECEIVED OUR FAMOUS Catalog "D", the great money saver on Contractors', Cement and Concrete Machinery Mixers, cars, rails, etc. Mailed everywhere. M. Mitshkun Co., Detroit, Mich.

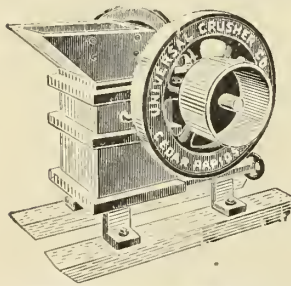
SACRIFICE SALE — NEW HAYDEN Automatic Block Machine, 8x8x16", Rock and Plain Faces, 300 iron pallets. Will be shipped from Northern Indiana. Price 50% of original cost. Jesse P. Montz, 722 N. 10th St., Waco, Texas.

MACHINERY FOR SALE—KRAMER Tamper, 24-inch, perfect condition, \$100.00; two U. S. Standard Block Machines; two Snell Mixers; Sill Machine; Pallets, etc. Abbey-Brooks Co., Newark, N. J.

BOOKS ON CONCRETE

Write for
Free Catalogue

Concrete Publishing Co.,
DETROIT, MICH.



See the UNIVERSAL Crusher at the Kansas City Show

We want you to see the UNIVERSAL crusher in operation at the Kansas City Cement Show this month.

We will have a No. 2M UNIVERSAL in operation, showing just what it will do on material. If you have something hard to crush and can get to the Show, don't fail to look us up.

The No. 2M has an opening 5½" x 12" when fitted for fine grinding, and 8" x 12" with the corrugated jaws for coarse crushing. It weighs 3000 lbs., takes 6 H. P. and will give from 20 to 50 tons in 10 hours, depending on how fine you want it.

This is certainly the machine for your Block or Tile plant, for your Gravel Pit, for handling the rejections in your Quarry, or for any place where uniform fine material is needed. Every machine is sold on a 30 days' trial to your heart's content,—fair enough for any man. Can we count on seeing you?

UNIVERSAL CRUSHER COMPANY

33 B. Avenue

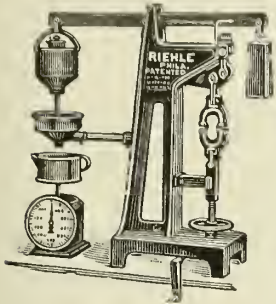
CEDAR RAPIDS,

IOWA

Mr. Reader:--It will pay you to watch this page from month to month

Advertisers

To manufacturers of small specialties not profitably advertised in big space and manufacturers of heavy equipment who want to "feel out" this field we recommend the use of advertising space on this page. Advertising space here is given distinctive position, and will bring results. This rate is low because no large space is sold; you can keep your proposition before our readers the year 'round at little expense. No advertisement accepted to occupy more than 3 inches single column, on this page. Ask for rates.



RIEHLE AUTOMATIC CEMENT TESTING MACHINE

Pat. Nov. 8, 1904.

Solid Back Grip

Pat. Sept. 11, 1900

Pat. June 10, 1904

Testing Outfit

1424 North 9th St., Philadelphia, Pa.

REICHERT METAL FORMS

Save 3 Cents Per Square Foot
on Concrete Walls.

Reichert Manufacturing Co.

MILWAUKEE, WIS.

Barten Process and Machine

For Making Concrete Building Blocks of a
Slushy, Muddy Mix, also of a Moist mix.

1000 machines in one, and by far the lowest in
price. Send for catalogue.

W. H. Barten,

Gordon, Nebr.

CHARLES E. SIMS

Consulting
Engineer

Worthington, Minnesota.

Cement drain tile factories designed.
Detailed plans, specifications and cost for
building and equipment. Proposed sites in-
vestigated.

For Building Concrete Steps

My adjustable form holders en-
ables any man to set up forms for
steps, one piece at a time. Every
part of form true and square. Take
form down one piece at a time.
Saves time, labor and money. Pat-
ent applied for. Send for circular
and prices.

H. L. PARK

Reading, Mass.

Mixers and Brick Machines

Write us for our catalog and new
plan of selling mixers and brick ma-
chines at rock bottom prices.

Wettlaufer Bros.

Buffalo, N. Y.

Sanitoid Flooring

A Composition Mineral Substance laid in
monolithic form and producing a fireproof,
waterproof, permanent, and sanitary floor-
ing base, or wainscot. Methods of install-
ing SANITOID are simple and easily
learned. Can be sold at good profits for a
hundred different uses. Write for material
costs and territory, rights today.

The Sanitoid Products Co.

701 Brunson Bldg.

COLUMBUS, O.

Crushed Granite

Screened to size, for concrete or arti-
ficial stone. The strongest and most
durable aggregate. Two colors, gray
or white. Woodbury Gray Granite
is mouse-gray in shade. Hardwick
White Granite is the whitest granite
known. In carlots, at a low price.

Let us quote you also on granite
sills or trim for use with concrete
work. Quick delivery.

WOODBURY GRANITE CO.,

Hardwick, Vermont.

SPRUNK Engraving Co.



**\$11.65 Buys
The Mold for
This Concrete
Vase.**

Diameter bowl
Height of Vase 16

This Rapid Concrete Vase Mold com-
pletes a vase every 12 minutes with only
one man, at a cost of 17c. each. Built of
heavy gray iron, carefully fitted and fully
guaranteed. Prompt shipment. Four
styles and sizes. Write today for circular
of ornamental concrete molds.

A. A. HOUGHTON,
Dept. C, Northville, Mich.



Speaking of concrete block machines, listen to me---

You've heard a lot about hand power block machines, their core action, their speed and their variety of output.

Now figure this—if you are in the block business to make money, to make a good product that will advertise itself and increase your business—you want a machine that will make hard, dense blocks, fast. Labor is your biggest item of expense. Get a machine with big output and if the product is good your business will grow.

Concrete that isn't made wet is worthless. You can't water a block so well after it is made as you can while you are making it. In a block machine which releases the cores while the block lies on its face, or on its back, you can't use a wet mixture—the concrete can't support itself over the core openings. Try it and see.

4 Important Points About my Face-down, Wet-process Block Machine



THE FASTEST HAND POWER BLOCK MACHINE MADE.

First. It is the only face-down block machine in whose operation wet mixture and great speed are combined.

Second. It is the only face-down block machine which withdraws the cores vertically and automatically with a positive lever action AFTER the block has been turned over.

Third. It is the only face-down block machine on which the block is turned over by a counter weight and not by main strength and awkwardness.

Fourth. It is the only face-down block machine which makes a continuous-air-space-block, tied with metal ties, in addition to the regular hollow block, in unlimited variety.

With my block machine ready for business, you tamp in your facing, with the backing, draw the cores in horizontally, tamp in the rest of the concrete, strike it off, touch the counterweight, thus turning the block up. Withdraw the cores vertically by a lever, this action carrying the completed block out to you on its pallet. When the block is removed, you close the mold box and, without another motion, your machine is in the same position in which it started—NOT A LOST MOTION ANYWHERE

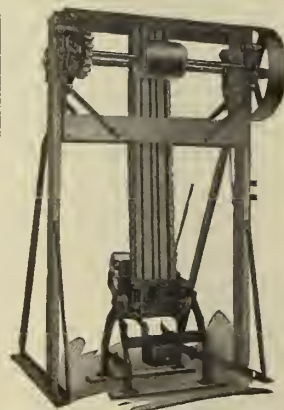
I also manufacture drain tile machinery, power sewer pipe machines, hand tile molds, power brick machines, hand brick machines, mixers, elevators, etc. I issue 16 catalogs. Tell me what machinery you need.

Herman Besser,
President

**BESSER
MFG. CO.**

103 12th Street

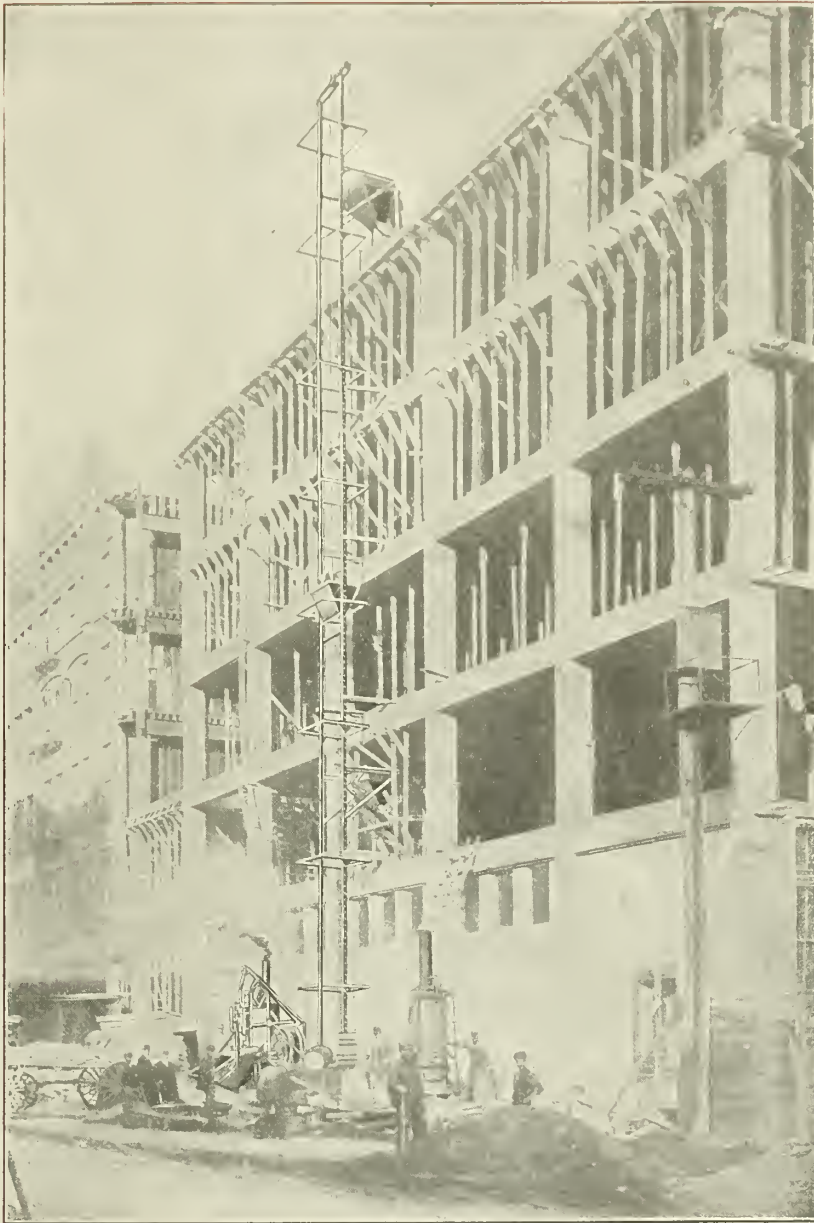
Alpena, - Mich.



Besser Face-Down Block Machine working under a Besser Automatic Tamper—the Tamper will fit ANY machine.

The first thing put into Besser machinery is QUALITY

Mixing and Elevating Concrete



THIS photograph shows a **CHAIN BELT** Elevator elevating concrete at the Boston Store, Milwaukee, without using a supporting tower. Also the concrete is being laid at two floors at the same time. **CHAIN BELT Mixer** on the job.

❑ **CHAIN BELT Mixing Plants** will mix and elevate your concrete in the shortest time and at the minimum cost per yard, because:

❑ The **Mixer** is quickly charged and discharged—is built entirely of steel and requires no blocking up—has no gears to wear out—has plenty of power and drum capacities are liberally rated.

❑ The **Elevator** is all steel—self-supporting—requires no tower—has the simplest tripping device and operates with speed and smoothness.

See us at the Kansas City Cement Show

CHAIN BELT CO., - Milwaukee, Wis.

ESTABLISHED 1882



Packard Motor Car Co.'s
Plant, Detroit, Mich.
Reinforced Concrete Building
500 Feet long, 60 feet wide
20,000 barrels PENIN-
SULAR PORTLAND
CEMENT USED in its
construction.



USE Wabash Portland Cement

Best for All Kinds of Concrete Work
Great Strength and Durability. Fine Color and Uniformity

Sold by the Best Dealers

Wabash Portland Cement Co.

Phone Main 859

1824 Ford Bldg., DETROIT

WOLVERINE PORTLAND CEMENT

More Than Nine Years of Satisfaction

Unexcelled for Strength and Uniformity

Manufactured by the

Wolverine Portland Cement Company

COLDWATER, MICHIGAN

Write for Prices and Booklet.

W. E. COBEAN, Sales Agent, COLDWATER,



Why you should buy our Cement

It is exceptionally uniform in color.

It is ground fine—over 96% passes a 100 mesh sieve.

It is made under the COWHAM SYSTEM—a guarantee of worth.

It is made in large quantities—on good railway connections—insuring prompt shipments.



Write for the Northwestern Prices

When you are in the market for cement give us a chance to figure with you. Our cement has great strength—you should use it, and if you will write us we are sure we can get together.

Write for Our Book on Cement.

Northwestern States Portland Cement Co.

(COWHAM SYSTEM)

Works and General Offices,
MASON CITY, IOWA,

U. S. A.

CONCRETE

VOLUME XII

APRIL, 1912

NUMBER 4



Use "Chicago AA" Portland Cement

"THE BEST THAT CAN BE MADE"

Our booklet, descriptive of the "Chicago AA" process, is free to cement users. Write for a copy today.

CHICAGO PORTLAND CEMENT CO.,

Dept. 86, Chicago, Ill.

J. U. C. McDANIEL, Sales Mgr

Present Output 1,500,000 barrels annually

ALPHA PORTLAND CEMENT

The Recognized Standard American Brand



A strictly straight Portland which for uniformity and general excellence cannot be surpassed. It is absolutely pure and unadulterated. Contains no furnace slag or other by-products.

BEST IN THE WORLD FOR SIDEWALKS
Write for our handsomely illustrated book, sent free.

ALPHA PORTLAND CEMENT CO.

5 Centre Square, Easton, Pa.

BRANCH OFFICES: Board of Trade Bldg., Boston; Hudson Terminal Bldg., New York; Builders' Exchange, Buffalo; Oliver Bldg., Pittsburgh; Marquette Bldg., Chicago; Harrison Bldg., Philadelphia; Builders' Exchange, Baltimore; National Bank Bldg., Savannah.

There's an advertisement on

Page 21

of this issue of CONCRETE
that will interest you—
turn to it now.

"LEHIGH" PORTLAND CEMENT

Recommended for high-class engineering work. High tensile strength. Finely ground, light and uniform in color.

LEHIGH PORTLAND CEMENT CO.

Head Office, ALLENTOWN, PA.

Main Western Office: 521-532 Peoples Gas Building
CHICAGO, ILL.



THE BEST FOR ALL USES



**WM. G.
HARTRANFT
CEMENT
COMPANY**



**Sole Selling
Agents
PHILADELPHIA
PA.
Real Estate Trust
Building**



ILLUSTRATED CATALOGUE SHOWING WORK DONE WITH THESE CEMENTS SENT FREE UPON REQUEST

An Announcement

To Engineers, Architects, Contractors
and Inspectors of Construction

New solutions of problems in concrete construction are constantly being made; new and improved methods are being followed; new devices and equipment are being employed; new uses for concrete are being found; new cost figures are being established. YOU have some ideas—fresh from YOUR OWN experience on the subject of which the Editors of CONCRETE will be glad to correspond with you.

Write to The Editors of CONCRETE, Detroit, Mich.

CONCRETE

CONCRETE PUBLISHING COMPANY

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DETROIT,

MICH.

ADVERTISERS' INDEX, PAGE 23

ONE DOLLAR A YEAR

COPYRIGHT 1912 BY
CONCRETE PUBLISHING CO.

FIFTEEN CENTS A COPY



Cheesman Memorial, Denver, Colo.
Marean & Norton, Architects

Approximate Cost, \$100,000.00

MEDUSA WHITE PORTLAND CEMENT

[USED FOR FOUNTAIN, WALL AND BALUSTRADES

WE ALSO MANUFACTURE

MEDUSA GRAY and WHITE WATERPROOFED CEMENTS

MEDUSA WATERPROOFING

WRITE FOR FREE ILLUSTRATED BOOKLET AND SAMPLES

SANDUSKY PORTLAND CEMENT CO.

SANDUSKY, OHIO



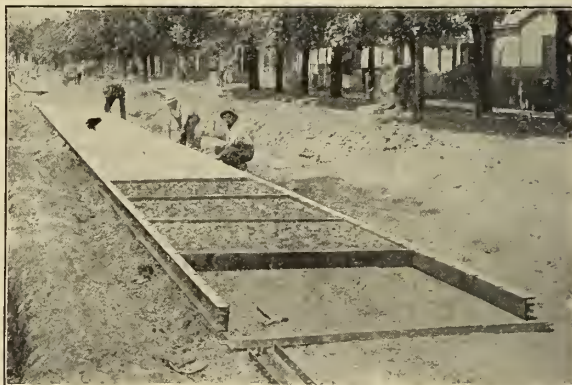
Blaw Steel Forms for Concrete Construction

The Blaw System practically eliminates the cost of form work in the construction of

CONCRETE HOUSES

Simplest, best and cheapest. Cannot build crooked walls. Blaw Forms require less than half the labor in handling that other forms require.

Complete steel form systems furnished for the largest as well as the smallest concrete buildings for every purpose.



Agents wanted in all parts of the country to sell Blaw Sidewalk Curb and Curb and Gutter Forms.

Blaw forms are designed from the contractors standpoint. They are light, rigid, quickly and easily handled, and will last a lifetime. The design is simple and the cost low. Our engineering department is at your service—tell us what your problem is.

Blaw Forms have been used on over 5000 Contracts

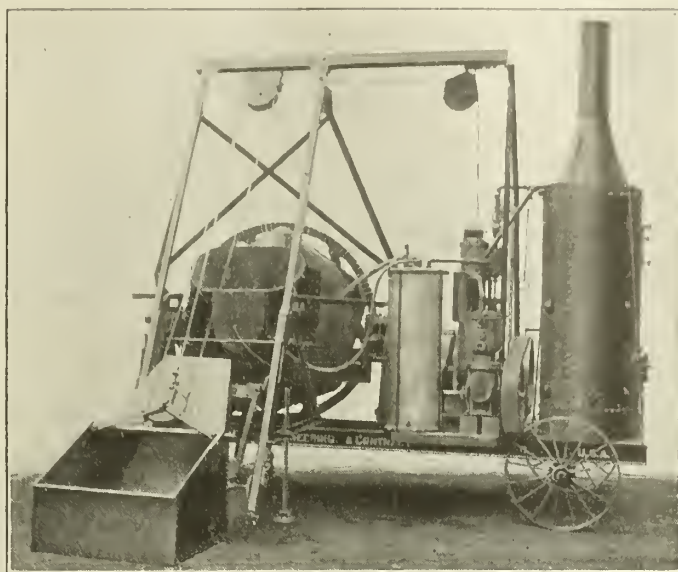
Sewer Centers	Pipe Molds	Aqueduct Centers	Tunnel Forms	Subway Forms
Shaft Forms	Wall Forms	Large Span Arch Ribs	Culvert Molds	
	Silo Forms	House Forms		

Blaw Steel Centering Company - General Offices, Westinghouse Bldg., Pittsburgh, Pa.

New York—165 Broadway.

Chicago—917 Ashland Block.

A Batch of Asphalt Concrete in Three Minutes



Can be secured in a Chicago Improved Cube Mixer with an Austin Hot Mixing Attachment.

Use the mixer as ordinarily to mix cement concrete for the base, then start the heat and mix asphalt concrete for the top. One machine does double service.

A better asphalt concrete is obtained by mixing than by pouring.

The perfect mixing qualities of the Improved Cube Mixer which have so long been recognized as cement savers are just as effective in saving asphalt. In addition there results a homogeneous pavement—every square foot of the same even density and hardness.

The Austin Hot Mixing Attachment is simple, strong, and easily operated; the heat can be turned on or off at will. It can be used to dry or heat sand and stone or to mix hot concrete for freezing weather work.

Send for "Special Circular No. 28," describing Cube Mixers with Heating Attachment.

Municipal Engineering & Contracting Co.

Specialists for 25 years in building high efficiency labor saving machinery for engineering work

Main Office—Railway Exchange Bldg., Chicago.

New England Agents—Dyar Supply Co., 510 Main St., Cambridge, Boston.

San Francisco Agent—The Lansing Co., 338 Brannan Street.

Eastern Office—30 Church St., New York City

Western Pennsylvania Agent—J. S. Beckwith,

108 Parkway, N. S., Pittsburg.

AGENTS WANTED IN UNOCCUPIED TERRITORY

OVER 3,000,000 CUBIC YARDS OF BLASTED ROCK

were handled by Hayward Buckets at Greenville, N. J., to make the fill for the Pennsylvania Freight Terminal. The Superiority of

Hayward Orange Peel Buckets

for the handling of blasted rock and heavy boulders is not questioned among contractors and engineers of recognized authority.



Illustration No. 212

Hayward Buckets and Digging Machinery

are now accepted as the standard on account of their adaptability, durability and reliability. Write for Catalog.

THE HAYWARD COMPANY

50 Church Street, NEW YORK

CONCRETE REINFORCING BARS

PLAIN, COLD TWISTED & HOT TWISTED

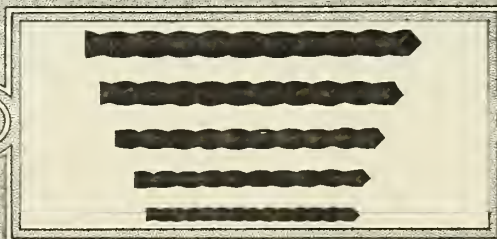
New Billet Stock

Billet Stock

Rail Carbon

MECHANICAL BOND WITHOUT EXCESS WEIGHT

All Sizes of Rounds, Squares and Flats



Large Stock of Cold and Hot Twisted Bars for Immediate Shipment

We solicit particulars of your requirements

INLAND STEEL COMPANY

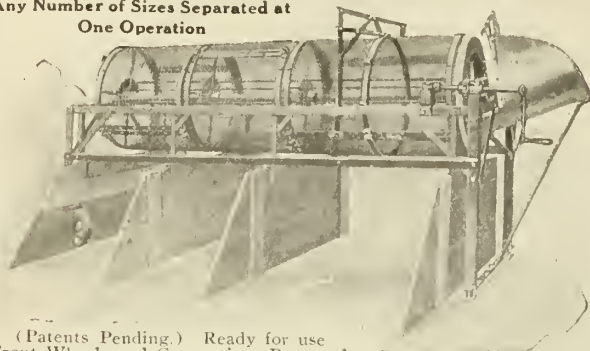
FIRST NATIONAL BANK BLDG. CHICAGO

WORKS: INDIANA HARBOR IND. - CHICAGO HEIGHTS ILL.

CONVERSE ROTARY SCREEN

TURNED BY HAND OR POWER

For Sand, Gravel, Crushed Stone, Coal Screenings, Etc.
Any Number of Sizes Separated at
One Operation



(Patents Pending.) Ready for use
Front Wheels and Connections Removed.

Each Section is made of two half sections, attached to the cylinder by only six bolts, so they may be easily changed to those having other spaces.

The sections are made in exact sizes and are interchangeable.

If by trial, sections of different spaces between wires are wanted, we exchange.

The partitions are removable by turning the turn-buttons on the posts.

Purchaser makes partitions from any rough boards.

To run by power remove the crank and substitute a pulley.

Crank is located at feed end at a comfortable height, enabling one man to operate, if desired, by alternately filling hopper and turning crank. Chain transmits the motion from a small sprocket on crankshaft to a larger sprocket on main shaft, thus taking less power.

Our device for cleaning the sand out of the fine meshes overcomes clogging and largely increases the screen's capacity. As the screen revolves the band around the middle of the first section is struck a sharp blow by a lever-hammer at short intervals, thus jarring from the fine meshes any clogged sand or fine gravel. (See Cut.)

It is mounted on four 14-inch wheels. The front wheels, gear and tongue are removed when in use, and do not show in the Cut.

With a graded material such as our screens produce, a dense waterproof and water-tight mixture is secured.

The time spent in ordinary hand method screening yields but one grade of material, while the Converse Screen yields four sizes.

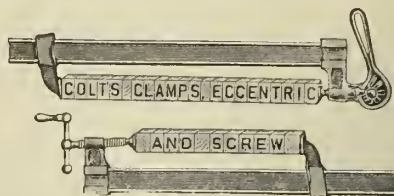
Other Diameters with more or less sections to order.

Prices and additional information on application.

F. S. CONVERSE 101 Chestnut Street Binghamton, N. Y.

COLT'S CLAMPS

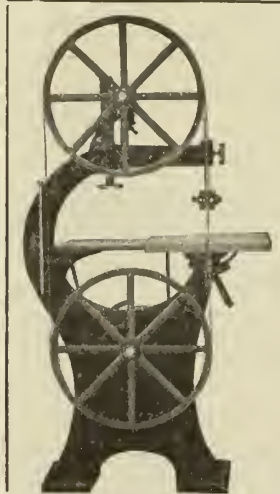
Will save you time in adjusting your moulds and in knocking them down after the work has set.
Ask for catalogue No. 137.



BATAVIA CLAMP COMPANY
69 CENTER STREET BATAVIA, N. Y.

This Crescent Band Saw Makes \$1,000 a Year For One Concrete Block Man.

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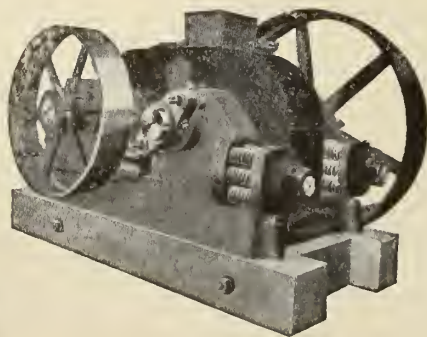
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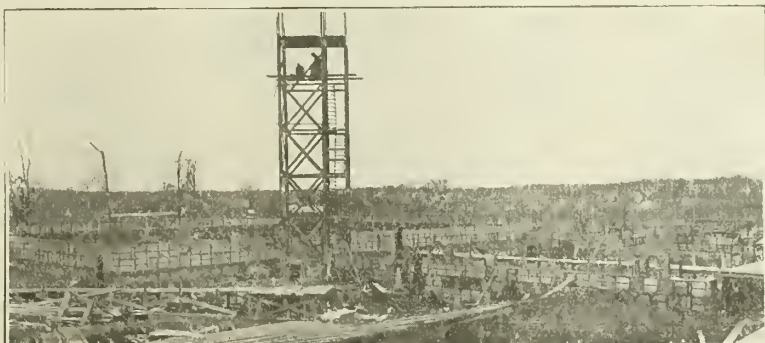
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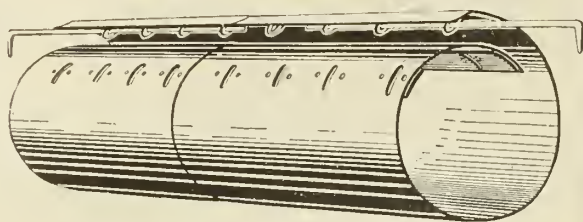
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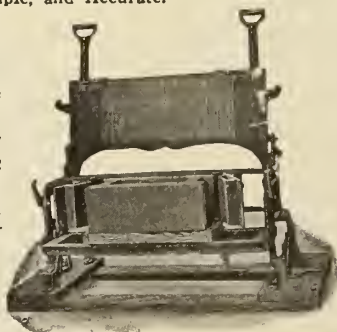
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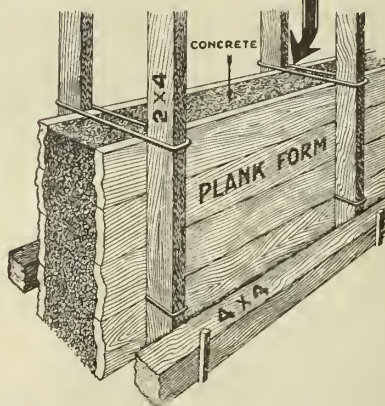


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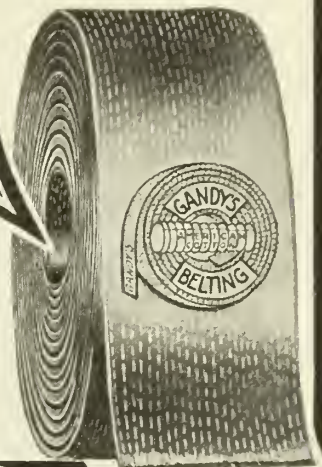
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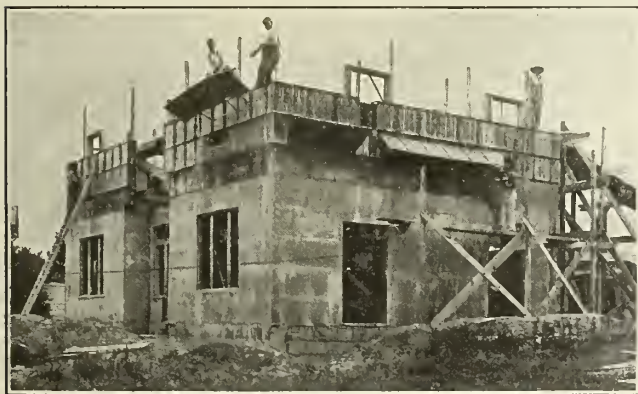
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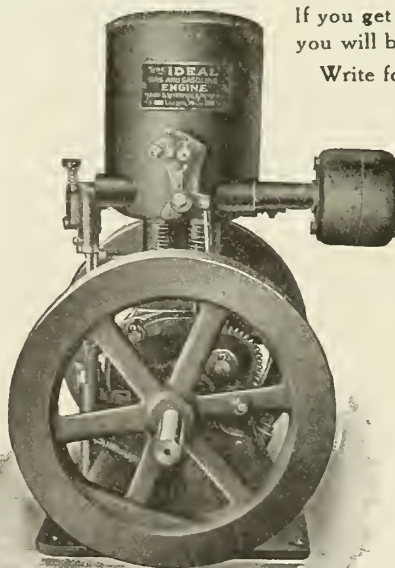
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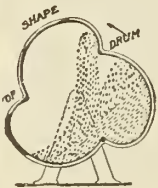
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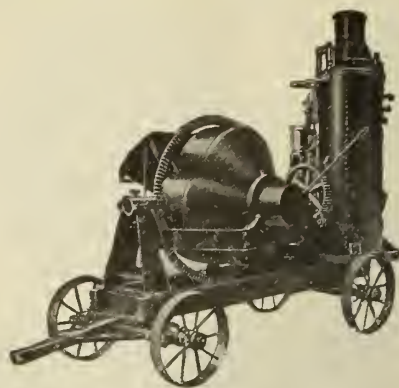
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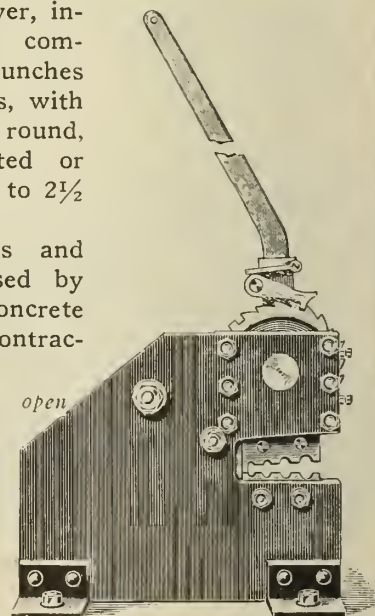
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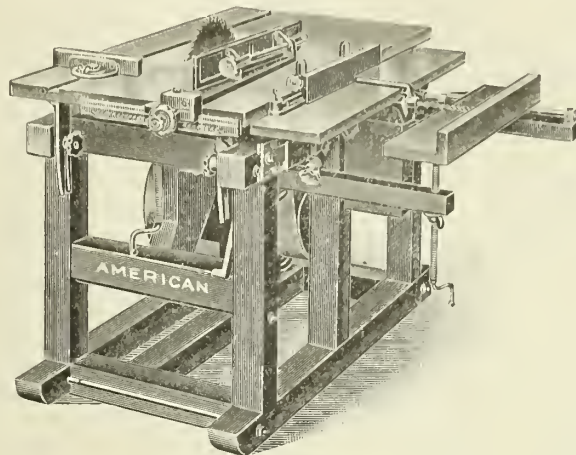
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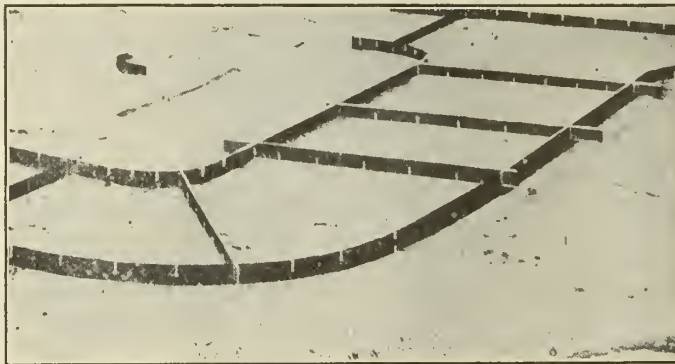
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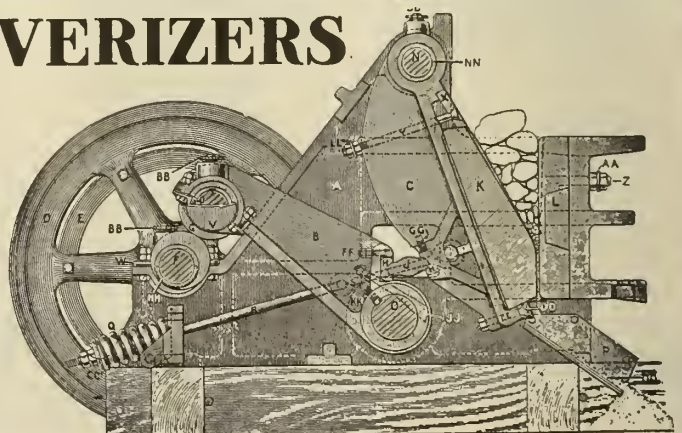
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For May, 1912

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IF all users of Concrete and Mortars would **JUST STOP AND THINK** of the great saving of labor and cement made through the use of **MIXERS** every user would be in possession of one, once interested. Users of Concrete and Mortar are discriminating more and more in favor of the

LANSING - ADVANCE!



We want to tell of its many advantages and reasons for its growing popularity.

MORTAR MIXER

We carry these in stock at our warehouses named below.

Write for catalog J. M.



CONCRETE MIXER

LANSING COMPANY

Formerly Lansing Wheelbarrow Co.

37 Forest Ave., LANSING, MICH

WAREHOUSES:

New York, 102 No. Moore St. Chicago, 169 W. Lake St. Minneapolis, 330-4 No. First St.
Kansas City, 923 Mulberry St. Philadelphia, Willow and No. American Sts.
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The Finger Ring Levels

The ideal tool for setting forms for concrete, laying cement block, raising leads and corners and topping out flues. These are only a few of the many uses the mechanic has for this level.

Buy one today and be convinced of the real merits and utility of this tool.

If not sold by your hardware dealer, write to us, giving name of your dealer, and get our beautiful illustrated booklet of "How Jack Finnigan Saved His Job."

THE KOKOMO LEVEL CO.

Kokomo, Ind.

General European Agents:
Lindenthal & Co., Berlin, Germany
Agents Great Britain:
The (U. K.) Winget Concrete Machine Co.,
Newcastle-on-Tyne, England
Asiatic Agents:
Joseph Edward & Co.,
Victoria Road,
Karachi, India.

In ordering, please give measurement of finger



Level and
Plumb
Combined

Cement Pipe and Tile

By E. S. HANSON

NEW EDITION

NOW READY

A working manual from start to finish. Takes up in detail the location, design and equipment of plants, methods of manufacture, kinds of machines, amounts of materials, figures, on the cost of production at various points, little "kinks" which will aid in satisfactory and economical production, etc. It will endeavor to be so complete as to furnish an answer on almost any question which can arise with regard to this important branch of the concrete business. More space will be devoted than heretofore to matters pertaining to large pipe for transmission mains, sewers and the like, giving a considerable amount of data from various cities and other places where large pipe has been used. Sent prepaid for \$1.00.

The Cement Era Publishing Co.

Chicago

Cement Directory

1912 EDITION

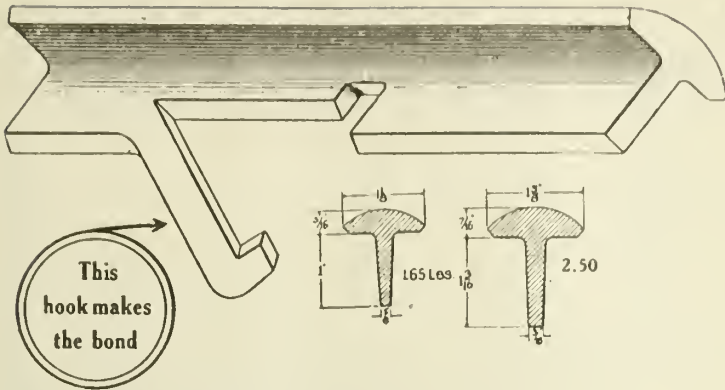
NOW READY

A thorough revision of the well known Directory of Portland Cement Manufacturers, together with Manufacturers of Gypsum and Lime, bringing down to date descriptions of manufacture, capacity, capitalization, accompanied by names of officers and superintendents, post-office addresses, a list of brands and a buyer's guide.

This directory stands alone. It has an established reputation of six years as reliable, up-to-date and authentic, complete, neat and handy. Is so useful and handy to anyone in these industries that it is almost indispensable. Order now for immediate delivery. Sent postpaid for \$1.00. Contains 250 pages, 3x5 inches, to fit the pocket; bound in black flexible leather covers; gilt edges.

The Directory of Portland Cement Manufacturers

1207 Morton Bldg., - Chicago, Ill.

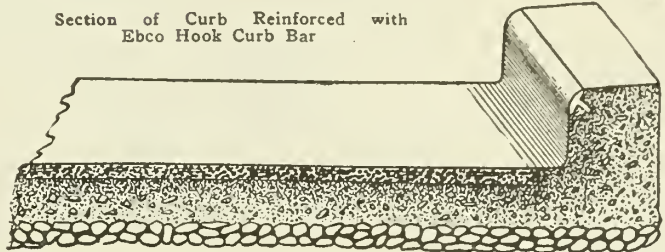


Protect and Reinforce the Corners of Your Concrete Curbing

City engineers and contractors who have had trouble with the old sandstone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear.



Section of Curb Reinforced with EbcO Hook Curb Bar



EBCO Hook Curb Bar

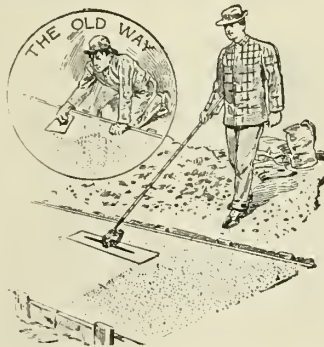
is a steel member to be embedded when the concrete is poured, forming a permanent protecting edge and acting as a reinforcing member as well.

These bars have shear members which bond perfectly with the concrete. Rolled in straight lengths and in curves for street corners. They come in 10 ft. lengths, seven anchors in each length. Write for circulars.

EDWARD E. BUHLER & COMPANY MANUFACTURERS

Sales Office: 103 Park Avenue - - - New York City
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Louisiana Agents: Standard Paving & Construction Co., 321 Godchaux Bldg., New Orleans, La.
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Canton and Akron, O.: Fred Fogarty, Akron, Ohio.
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Baltimore, Md.: Hudson Cement & Supply Co.

Make Lower Bids—And Higher Profits BY USING OUR LONG HANDLED FINISHING TOOLS



One finisher can do several times as much work in a day as he can with hand tools; smoother work, too. Tools are equipped with long handles to enable operator remain standing at his work. Saves backaches and sore knees. Finisher trowels backward and forward across the walk. All the work may be performed from one side of the walk. Our patent device automatically tilts the edge of the trowel blade to prevent digging into the mortar.

SENT ON FREE TRIAL—No Cash in Advance

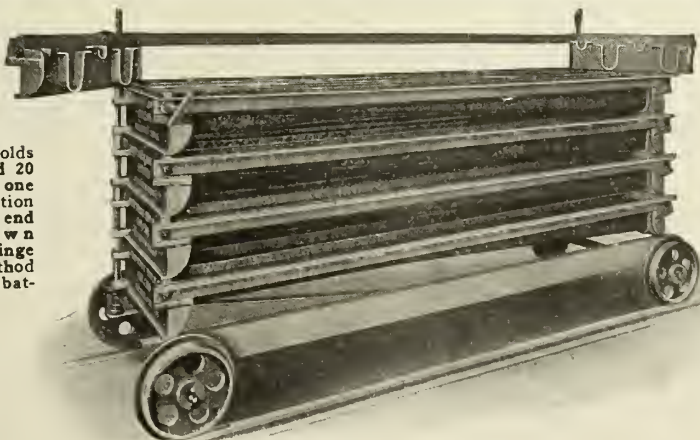
Any tool or complete set sent to any responsible contractor on 10 days' trial. No cash in advance. Try them on your own work before paying for them. We make trowels, jointers, edgers, floats, etc.

Free catalogue mailed on request—send in your postal today. Address

Twentieth Century Manufacturing Co.,

1650 LOWE ST., - - - CHICAGO HEIGHTS, ILL.

Batteries of molds making 30 and 20 wet posts at one time. Top section emptied and end frames thrown back on hinge showing method of emptying battery.



CONCRETE FENCE POSTS

T-Shape makes them
Strongest—Lightest—Cheapest

Our molds and posts are used all over the world. Used by leading U. S. railroads and interurbans. We guarantee our molds absolutely. See our exhibit at the Kansas City Cement Show, March 14-21.

OHIO POST MOLD CO.

1341 Nicholas Bldg., Toledo, O.
Write for our catalog.

Labor is the Big Cost Item—How to Cut it Down

Whether you do general contracting work or operate a concrete plant, if you can cut down your crew by one man, it means about \$800 a year to you.

You can cut your labor costs by using labor-saving equipment—cars, barrows and trucks for handling raw material and finished product.

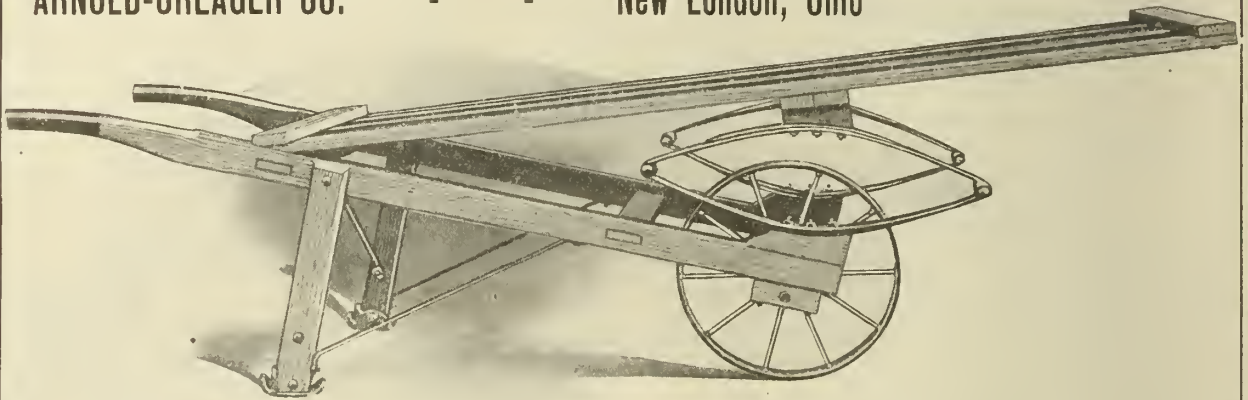
We manufacture a special line of trucks, cars and barrows for concrete men. We make barrows for sand, cement, gravel and mixed concrete—special spring barrows for green concrete products—barrows for pallets and face-plates—carts for materials—trucks for handling the cured product.

We show below our special two-wheeled spring barrow for handling green block, brick or tile in the plant. The same barrow is made with two wheels if desired.

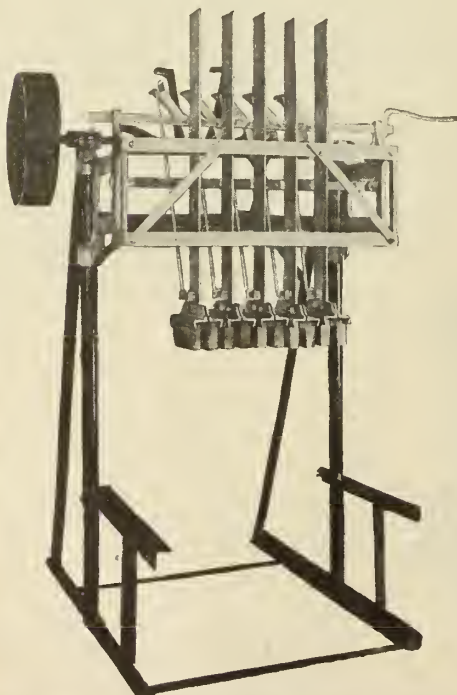
Write for our big catalog of carts, barrows and trucks. Such equipment is not expensive and it saves money.

ARNOLD-CREAGER CO.

New London, Ohio



DON'T TAMP YOUR LIFE AWAY



You CAN'T make good blocks or brick or other concrete products tamping along by hand. Your men start off nicely in the morning but the strokes get lighter and lighter as the day grows—the last block tamped at night isn't anywhere near as dense as the first one made that day. And your output is limited by your TAMPING, not by the speed of your block machine.

Increase your capacity, improve your product and save backache by installing a

NOLAN AUTOMATIC TAMPER

Built of angle steel. Mounted on the floor or hung from the ceiling. Fits any block or brick machine. Size, number and arrangement of tamping arms easily adjusted to fit any machine. Each tamping arm delivers a 50-lb. stroke, SIX TIMES EVERY SECOND.

The device is so constructed as to operate with a minimum vibration and is practically noiseless.

The purchase of this tamper won't be an EXPENSE, it'll be an INVESTMENT which will yield 100% return in a few weeks.

Write for descriptive circulars and details.

Automatic Concrete Machinery Co.

141 East Fifth St.,

ST. PAUL, MINN.

CEMENTKOTE

The fact that many of the largest users of concrete in the country are using CEMENTKOTE—that the largest concrete elevator in the world is damp-proofed with CEMENTKOTE—only goes to prove our contention—

That—Every Builders' Supply Co., Contractor and Architect should know that—They can get a damp-proofing that will damp-proof.

That—CEMENTKOTE beautifies and prevents spotting.

That—CEMENTKOTE lasts as long as the cement itself.

That—CEMENTKOTE does not interfere with the chemical action of the cement.

That—Anyone can apply CEMENTKOTE.

That—CEMENTKOTE is made in soft and pleasing shades.

That—CEMENTKOTE is not an experiment. In other words every Dealer, Contractor and Architect should know all about CEMENTKOTE. Ask for samples and descriptive matter, or better still, ask to have one of our representatives call on you.

The Tropical Oil Co.

CLEVELAND, - OHIO

Cemeline

Richmond Bros.,
117 Sixth Ave. E.,
Cincinnati, O.

I enclose \$1.65 for 1 gal.
of CEMELINE

Name

No.

St.

City.

State.

C-8-11

If you want to make your concrete proof against water, fire, acids and alkalies, paint it with Cemeline, "cement's proper affinity." This forms an impervious coating which not only protects the structure but decorates it. It comes in nine colors. Send the coupon and get a sample can for trial.

Cemeline

CEMENT'S PROPER AFFINITY

CEMELINE is a thorough waterproofing. It hermetically seals the surface of the concrete, filling all the voids. Prevents the appearance of stains. Colors the surface in pleasing tints without defacing the natural texture of the concrete.

It costs \$1.60 per gallon in 5-gal. lots. Send the coupon with \$1.65 and get a sample gallon. Try it. See how you like it.

RICHMOND BROS.

Paints and Varnishes

117 Sixth Ave. E., Cincinnati, O.

Cemeline



Stained with Cabot's Waterproof Cement Stains.
George Nichols, Arch't, N. Y.

Cabot's Waterproof Cement Stains

The Only Artistic and Waterproof
Colorings for Cement Work

Being Stains, they are transparent and they sink into the pores of the cement, giving soft, velvety coloring or effects without gloss and without spoiling the texture of the surface as coatings do. They are not "painty" and are cheaper, easier and quicker to apply, go farther, wear better and are infinitely handsomer than any paint or coating. They cannot crack, peel or chalk, like coatings, because they are stains, not coatings.

Send for colors and full information.

SAMUEL CABOT, INC., Mfg. Chemists, BOSTON, MASS.
1133 Broadway, NEW YORK. 350 Dearborn Ave., CHICAGO.
Agents all over the country.

BITU-MORTAR WATERPROOFING WATERPROOFS PERMANENTLY

A bitumen preparation which bonds to old or new walls and waterproofs cellars and foundations PERMANENTLY, even when water is seeping through. Applied inside or outside of walls. Resists any water pressure that the wall itself will stand.

THE BITU-MORTAR CO.

342 E. 27 St. NEW YORK CITY

Send for a free copy of our book, "The Ideal Method of Waterproofing."

Coleman's Waterproof Filler

A waterproofing liquid that does the work effectively and permanently. A positive water resistant and shield against dampness and decay. Not a stain nor a coating but the only transparent waterproofing liquid FILLER patented. Chemically prepared and designed for waterproofing Concrete Blocks, Brick Walls, Stone, Wood, Plaster, Kalsomine. Penetrates the surface and becomes a part of the material to which it is applied. An honest compound. The best by test. Give it a trial. Send for Booklet.

Virginia Waterproofing Corp. Mfgs.

324-326 Arcade Building,

NORFOLK, VA.

SCRAP THE REST—USE THE BEST

HERE IT IS

If You are One of These

Who Want to Improve Your Factory and Make
REAL CONCRETE STONE

At Less Cost than Blocks You Now Make. Be the
Only Concrete Man of Your Locality. Have a Real
Business and Be Proud of It.

WRITE US NOW FOR OUR PROPOSITION

Test of our Concrete Stone, 3,500 lbs. per sq. in., 4% Absorption.
Mixture 8 to 1.

How Does Yours Compare?

Send us a sample. We will test it.

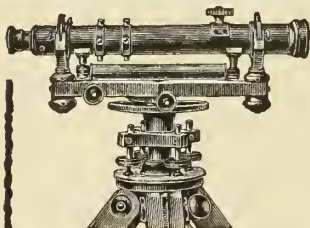
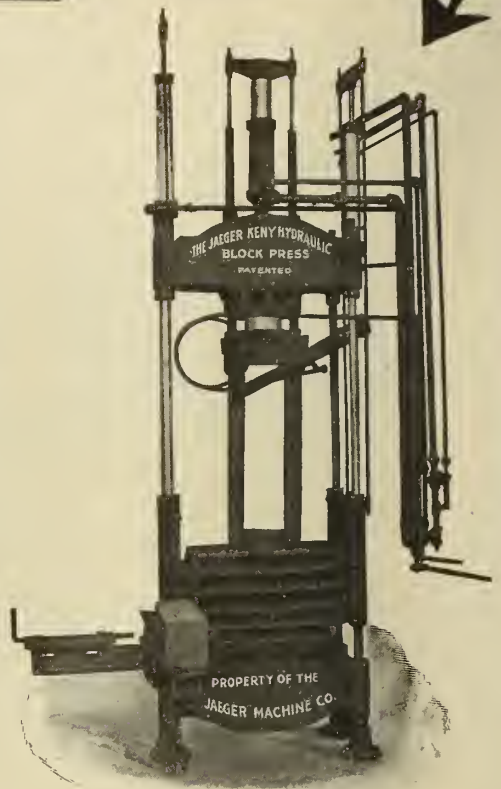
Which is your choice?	Which will stand up?
Which would you rather sell?	Which will hold your customer?
Which would you rather use?	Which will weaken his confidence?
YOU KNOW	WE KNOW

It is not a Little Question—But a Big One.

ARE YOU GOING TO CONTINUE IN THE BUSINESS?

At the Kansas City cement show, see the first moving pictures ever
produced showing a concrete products plant in operation.

Jaeger Machine Company
COLUMBUS, OHIO.



The illustration shows
our Architect's and
Builder's Level, for level-
ing walls, laying out an-
gles, grading streets,
sewers, drains, sidewalks,
etc. Ask for Circular 25.

LEVELS

The purchase of a level
or a transit isn't an ex-
pense, it's an investment.
Many times, by avoiding
errors, you can save the
cost of the instrument on
one job. Mistakes are
expensive. Engineers,
contractors, architects and
builders who use Kolesch
levels have error-proof
work.

KOLESCH & CO.

Surveying Instrument Makers. Established 1885
138 Fulton St. NEW YORK

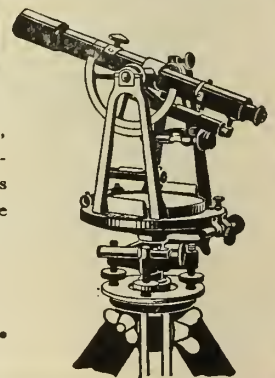
BUFF

The Buff is old in name,
but the most modern and up-
o-date in construction. It is
made by experts for the use
of experts.

Send for Catalogue 32

Buff & Buff Co.

Jamaica Plain Station
BOSTON, - - MASS.



For Extra Strong Concrete Construction

such as COLUMNS AND POSTS,
GIRDERS, LINTELS, AND ARCHES,
CEILINGS AND FLOORS, ETC.
for all concrete, re-inforced or otherwise, where great strength
is required.

Use our **Crushed Cobble Stone** all sizes.

Compression and tensile strength five times greater than lime-
stone concrete or concrete made of any other aggregate.

BEST MATERIAL ON THE MARKET FOR MACADAM ROAD
For Wearing Surface of Cement Roads, Factory Floors, Facing
for Cement Blocks or Monolithic Concrete, use our

COBBLE STONE SCREENINGS
We are also Miners and Shippers of
CONCRETE SAND AND GRAVEL

Michigan Portland Cement Paving Co.

Plant and Pits at Clarkston, Mich. Phones: Cherry 3080
Office: 915 Chamber of Commerce Bldg., Detroit, Mich. City 1030

VAN DORN'S

Steel

Joist Hanger

Specially Adaptable for

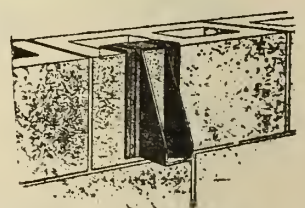
**Cement Building Block Construction, Brick
Walls, Wood and Steel Beam Girders**

SEND FOR CATALOGUE

The Van Dorn Iron Works Co.

CLEVELAND, OHIO

Structural Steel and Ornamental Iron Workers

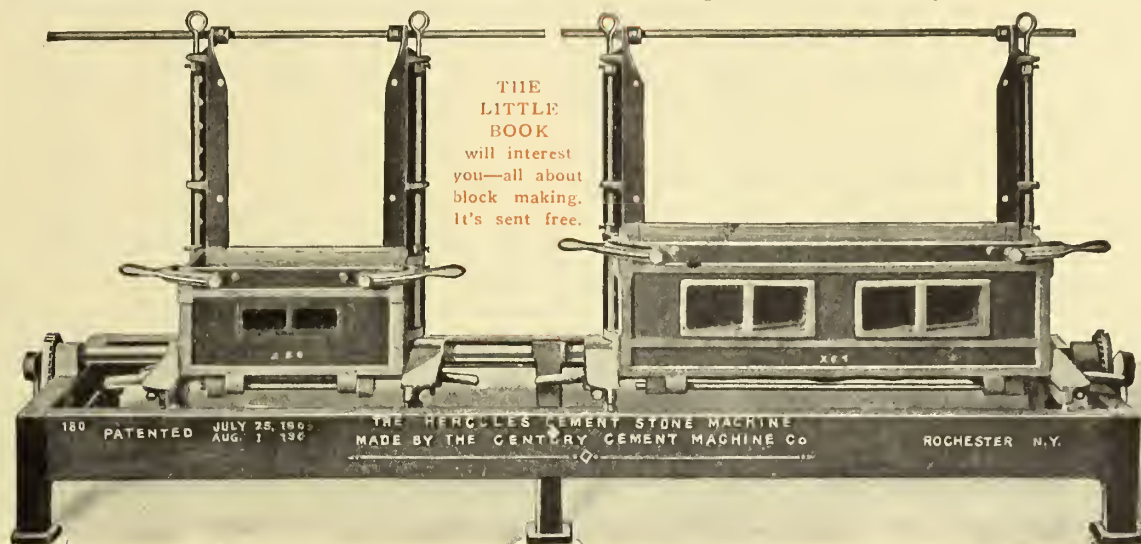


When You Buy a Block Machine one of the most important points to consider is its capacity

THE HERCULES MACHINE

is built up in units upon a single standard frame. You can buy a HERCULES that will make blocks as small as 4 inches and pieces as large as SIX FEET WATER TABLES AND SILLS. You can start in a small way, buying only the necessary plates for making a few sizes and then as your business increases and you have a demand for other sizes, INSTEAD OF BUYING A NEW MACHINE simply

add one or two inexpensive plates, attach them to your original machine and produce the block. THINK WHAT A SAVING THIS MEANS to you. This is but one great point covered ONLY in HERCULES machines. There are many others, all explained in a "LITTLE BOOK" we are sending out. Write for it today.



Century Cement Machine Co.

285-295 St. Paul St., Rochester, N. Y.



SHERWIN-WILLIAMS

S-W Concrete Finish is economical in application and service. It flows out smoothly and evenly over the surface, sealing the pores and covering a large area to the gallon. This lowers the cost of material and labor. Its splendid wearing qualities insure the greatest durability and satisfactory service. There is no better finish for factory walls, floors and ceilings where its rich, soft colors afford the best light distribution and its smooth, hard surface promotes cleanliness and sanitation. S-W Concrete Finish prevents the absorption of moisture and grease and wears splendidly on floors. Write for free sample folder.

CONCRETE FINISH

The Sherwin-Williams Co., 700 Canal Rd., Cleveland, Ohio.

How to treat concrete floors successfully—

Every architect, builder and engineer who has installed concrete floors has encountered difficulty in making them satisfactory. The concrete surface is likely to dust and may absorb unsightly stains. These minor objections to concrete floors are instantly and permanently overcome by applying

"CRECONTO" Concrete Coating

This material gives the concrete floor a smooth, hard, non-absorbent finish that prevents dusting and is a bar against oils, grease or other materials penetrating the concrete and leaving stains. Particularly important in factories, hospitals, jails, garages, etc. Applied quickly, dries in 12 hours.

Ask for color card and prices.

Fireproof Building Materials Co.

507 Reliance Bldg.

Kansas City, Mo.

Southwestern Contractors and Architects: Get our circulars and prices on metal lath, wall plugs, wall ties, stair treads, concrete carts, mixers, reinforcing steel, corner beads and general building supplies.



Trinity Methodist Church, Lincoln, Neb., built of white and granite faced brick. One Peerless Machine made them faster than the workmen could lay them. Brick made by Lincoln Stone & Supply Co.

The above is an example of the work that the Peerless is doing every day. In quality of product the

Peerless Brick Machine

Has No Equal

The Peerless is made of high grade carbon steel and heavy malleable iron; it can't spring out of alignment as will sheet steel and angle iron, and will outlive its owner.

We guarantee its construction in the following unparalleled guarantee: If machine is broken or injured in operation we will replace any broken or injured part free of charge as long as machine is in the hands of the original purchaser. Will others do this?

Cement is at the lowest price ever known. Buy the machine that will make money for you. Write for catalogue and booklet on cement brick.

Peerless Brick Machine Co.

9 North Sixth St., Minneapolis, Minn.

Capacity
12000
per day



ANNOUNCEMENT

to the subscribers of

CONCRETE

Many times I get a letter from a subscriber who says "Please send me such-and-such a number of CONCRETE—I loaned my copy and it never came back."

That leads me to believe that our subscribers have friends who are interested in concrete construction and who don't subscribe to this magazine. I have a plan that will benefit all three of us—it will save you the annoyance of having your paper carried away, it will provide your friend with a copy regularly, and it will add a subscription to our list.

Now, YOU—the subscriber who is reading this announcement—before you forget it, go out and have a talk with your friend. Get him to give you his order for a year's subscription to CONCRETE and pay you for it. Write his name and address on Coupon No. 1 below. Write *your* name and address on Coupon No. 2. Send both coupons and the one dollar to us (if your friend lives in Canada, make it \$1.50). We'll enter your friend's subscription as paid for one year and, to pay you for your trouble, we'll advance your subscription for one year.

There's just one proviso—your friend must of course not be a present subscriber—to get your own subscription advanced you must send one **new, paid** subscription to us.

Now all together—right now, before you forget it.

This offer expires May 1.

Circulation Manager

Concrete Publishing Co.

Detroit, Mich.

FILL OUT BOTH COUPONS

(This Coupon not accepted after May 1st)

No. 1

One dollar is enclosed to pay for one year's subscription for

Name

Address

City

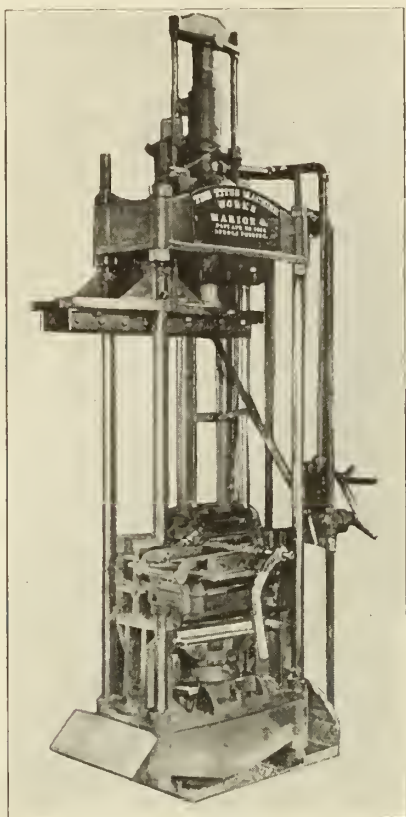
No. 2

For this service, please advance my own subscription one year.

Name

Address

City



Titus Hydraulic Block Machine

Forms concrete block of wet material under enormous hydraulic pressure, applied from above and from below simultaneously. Makes block any size, shape or style. Makes them fast. They're waterproof. Requires small amount of power. Titus blocks are the strongest concrete block made and command a good price in the market.

Our Proposition

We have perfected this press and have given it a two years' trial in actual use. To introduce it we are making a special low price on the first machine sold in each state.

We cannot ourselves properly cover the territory outside of Ohio and are offering outside territory at a remarkably low figure. For full particulars, address,

Titus Machine Works

Marion, Ohio.



THE HARTWICK

The Two-Trough Mixer

GARNER BROS. CO.,
General Contractors.

Detroit, Mich., Jan. 29, 1912.

Hall-Holmes Manufacturing Company,
Jackson, Mich.

Gentlemen:—

We have been using the Hartwick Concrete Mixer for the past four years with the greatest satisfaction.

Before we purchased a concrete mixer, we had at least six different makes on trial and after giving each one a thorough test, we decided to buy the Hartwick, it having given us the best result.

We think that the Hartwick Concrete Mixer is the very best on the market and would not hesitate a moment in recommending it to anyone contemplating the purchase of a mixer.

Very truly yours,
GARNER BROS. COMPANY.

The "Hartwick" has a double mixing trough, increasing capacity and improving the mixture. We also manufacture the "Grand" Continuous Mixers. Before you buy a mixer, get our catalogs.

Hall-Holmes Mfg. Co.

230 Oak St.

JACKSON, MICH.

Cement Plants

**DESIGNED
EQUIPPED
BUILT**

For the Wet or Dry Process

Engineering of cement works our special and exclusive business; cement making materials investigated and reports made upon the results obtained from chemical and physical tests, with recommendations of the proper machinery for the preparation of same; estimates, plans and specifications furnished in complete detail and all construction and installation work carefully supervised.

Grinding Machinery

Special machinery for the preparation of raw materials by the wet process, including wet grinding and pulverizing machines, washmills and agitating tanks, slurry elevators and pumps, and wet screening machines, made for the most efficient and economical handling of the materials. Our

Kominuters and Tubemills

for the dry grinding and pulverizing of raw materials, clinker and coal are acknowledged as being better than any other grinding and pulverizing machinery.

F. L. Smidth & Co.

50 CHURCH ST., NEW YORK.

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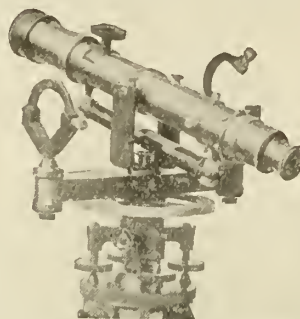
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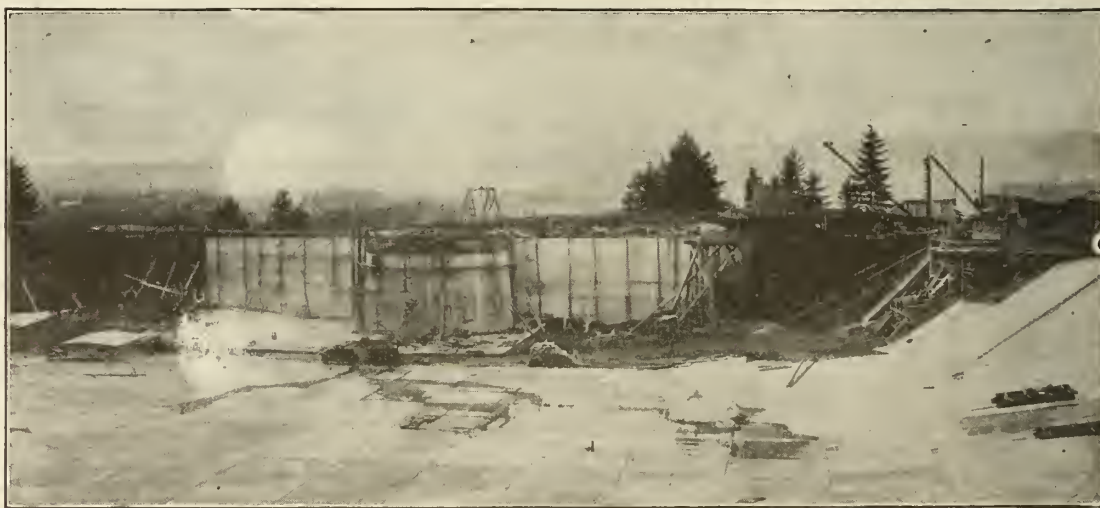


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Concrete Organizations, Officials and Conventions

Canadian Cement and Concrete Association; Secretary, William Snaith, 57 East Adelaide St., Toronto, Ont.

Iowa Association of Cement Users; Secretary, Ira A. Williams, Ames, Ia.

National Association of Cement Users, Harrison Bldg., Philadelphia, Pa.

Nebraska Cement Users' Association, Columbus, Neb.; Secretary-Treasurer, Peter Palmer, Oakland, Neb.

Cement Products Exhibition Co., 72 West Adams St., Chicago, Ill.; Secretary-Treasurer, J. U. C. McDaniel, 108 La Salle St., Chicago, Ill.

Oklahoma Cement Users' and Contractors' Association; Secretary, D. C. Patterson, 336 Bassett Bldg., Oklahoma City, Okla.

Northwestern Cement Products Association, J. C. Van Doorn, Secretary, Security Bank Building, Minneapolis, Minn.

Concrete Machinery Manufacturers' Association; Secretary, Le Roy A. Kling, Cedar Rapids, Ia.



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CONCRETE

Vol. XII

APRIL, 1912

No. 4

Editorials

MISSOURIANS who assumed the "show me" attitude can't complain that an opportunity to be "shown" was not afforded them in Kansas City, March 14 to 21.

* * *

THERE is this to say about the drain tile industry—more plants would manufacture concrete drain tile if their owners were aware of the actual possibilities of the business. Concrete products manufacturers need a good course of education in the drain tile business.

* * *

CONCRETE roads are not only commanding the attention of highway engineers, but they are also entering the calculations of traction experts. Some enthusiasts point out that the solution of the economical short-haul problem of the future will involve the construction of concrete highways upon which may be operated wagon trains drawn by special types of tractors.

* * *

SPEAKING generally, CONCRETE is not in sympathy with complaints that newly adopted building codes do not give concrete a fair chance in competition with other building materials, just because, as an instance, concrete block *has been made* that didn't meet the requirements of a code when it was adopted. This has resulted in inconvenience for the particular persons who had a supply of block on hand which they couldn't dispose of except outside the city limits. In some cases it has been found that the code isn't too strict, but that methods were too lax. *Concrete can stand restrictions.* The manufacturers of concrete products and those using concrete in other forms can adjust themselves to the new conditions with profit to themselves. When conditions under which concrete is to be used are standardized the public will accept the material much more readily. Standardization is important.

* * *

FURTHERMORE, standardization brought about through building code regulation puts every manufacturer and builder on an equal basis with every other. He needn't fear that "the other fellow" is going to skimp and thereby beat him in competition.

* * *

ON THE subject of building codes, Frank Zagelmeyer, Bay City, Mich., brings up an interesting point. He states that many codes require that a concrete block foundation for a house of more than one story, be 12 inches thick. This is absurd in the case of a frame dwelling a story and a half or two or even three stories in height. He believes a 10 inch wall would be too heavy, and that an 8 inch wall would be plenty. Bay City, which was built up during the lumber boom, has thousands of frame houses built on posts. Within the last two or three years about 2,000 block foundations have been put under these houses. A house was jacked up and the concrete

block wall laid. Then the whole structure was let down onto the foundation, placing the wall under greater strain than in the case of building a new house piece by piece on the wall. All the foundations are 8 inches thick and there has been no sign of failure, though some of the frame houses are three stories high.

* * *

Standardization was the key-note of the N. A. C. U. convention in Kansas City last month. It extended from specifications for reinforcing to specifications for concrete drain tile, with every product that comes between. This is as it should be. When it is considered that concrete is made as the result of a certain definite action, constant under constant conditions, it should be possible to secure a high degree of uniformity of product.

It is an axiom of the laboratory that like conditions produce like results. It is absolutely so in the field, but too frequently in field work, unnoticed conditions are unlike. Given specified materials in specified amounts, mixed in accordance with more definite directions than we now have, the concrete manufacturer is still confronted with differing and rapidly varying conditions of temperature, humidity and atmospheric pressure. All of these have a known effect on the quality of concrete, and sufficient study has already been made of them to give us safe limits of work.

The N. A. C. U. has done and is still doing important work along this line. It still has much to do. We should like to see the personal equation further eliminated in the one matter of mixing concrete. What one man regards as "thorough" or "homogeneous" may, and often does differ very materially from the opinion of the man in the next block who is trying to do the same kind of work.

Sessions of the association were uniformly interesting and covered a broad field. Abundant opportunity for discussion was given and more men than usual availed themselves of the chance to have their say. There are many points in the manufacture of concrete about which there is no difference of opinion among competent men, and there will be fewer as soon as all specifications are based on a large number of tests, carried out under known conditions.

* * *

Much has been said here about standardization. There is nothing more important in the concrete industry. More will be said on the subject from time to time. It is CONCRETE's favorite preachment. Isn't it yours, too?

William F. Eastman, formerly western manager for the Concrete Publishing Company with headquarters at Chicago, Ill., is no longer connected with this company in any capacity.

Good Kansas City Cement Show Is Not Well Attended

Kansas City, Mo., was invaded by a cement show for the first time in history when the Cement Products Exhibition Co. mounted an exhibit there March 14 to 21. And from many standpoints it was an unusually good show. The decorative scheme that had been used in New York and in Chicago was used again in Kansas City, and firms that have been going to every show since the beginning found their booths looking very familiar when they got on the ground.

The convention hall of the city is well adapted for shows, being large, well lighted and ventilated and easy of access from all parts of the city. Three things are of course essential to make a good show—a good place in which to hold it, good exhibits and good attendance. The Kansas City exhibit easily qualified on the first two. Not only in number but in interest and in value, the exhibits shown were well worth the while of any man or woman who is desirous of learning something about cement and its uses. They were attractive in themselves and attractively displayed. No fault can be found with the energy and the loyalty of the men who have for years been going to the shows.

From the third standpoint, that of attendance, the show was frankly disappointing. Several things are responsible for this. Missouri has not been overly prosperous within the last twelvemonth. Comparatively short crops, followed by a winter of unusual severity and length, with consequent delay in building operations, have caused the Missourians to become quite conservative. The lively fight between concrete and clay in Kansas City ought to have made for large attendance on the part of the citizen who takes an intelligent interest in seeing that his municipality gets the best possible material. But the intelligent citizen did not feel like paying 50 cents for a brief visit, which he would want to repeat from time to time. Numbers of people came to the door, inquired the price, learned that it was 50 cents—and went away. And these people were of all classes, contractors, engineers and architects. Concrete exhibits are new in Kansas City and are clearly in the educational stage as yet. People are notoriously slow to spend more than they think they can well afford in education. An admission fee of 25 cents, good for all day, would unquestionably have kept the hall crowded during office hours.

Another and a very important thing that affected the show was the attitude of the Kansas City newspapers. Two of them were openly opposed to the exhibit, even going so far as to refuse to accept the show's advertising, and failing to mention its presence in town at all. Two others, over-zealous, published statements so at variance with known facts, that they actually did the show more harm than good. For example, one of them came out the day after a very ordinary attendance with the statement

(Continued on page 70.)

N. A. C. U. Has Its Most Successful Convention

Valuable Papers and Discussions Reward Those Who Attend the Kansas City Meeting

With a large and interested attendance, the eighth annual convention of the National Association of Cement Users came to order in the banquet hall of the Hotel Baltimore, Kansas City, Mo., Monday evening, March 11, 1912. The members and guests were welcomed to the city by J. L. Harrington, past president of the Engineers' Club, and President Richard L. Humphrey of the Association extended the organization's thanks to its hosts. In order to make the convention feel still more at home, F. W. Pratt, president of the Union Bridge & Terminal Railroad Co., Kansas City, also welcomed the members.

Dr. Walter M. Cross, city chemist of Kansas City, read a paper showing how concrete was used to great advantage in constructing the water purification works of the city. The hypochlorite method of treatment is used, and reinforced concrete was the only material that would withstand disintegration, owing to the chemicals used in the process. George E. Tebbetts, engineer of the company that is constructing Kansas City's much needed new terminal station, presented a paper describing the plans and the progress of the work in hand. A tremendous expenditure of money is being made and the work, when completed, will give Kansas City railways facilities adequate for handling the enormous freight and passenger traffic that has for years been handicapped by lack of proper terminal and track equipment. This paper was illustrated on the screen.

For the Tuesday sessions, a change was made from the Hotel Baltimore to the New Casino on Broadway, where there is more room. A report of the committee on Specifications and Methods of Tests for Concrete Materials, of which Sanford E. Thompson, Newton Highlands, Mass., is chairman, opened the morning meeting. In Mr. Thompson's absence, the report was made by C. W. Chapman, New York City.

Particular interest attached to the paper by William M. Kinney, which took the form of a discussion on aggregates for concrete. Mr. Kinney is assistant inspecting engineer of the Universal Portland Cement Co., at Pittsburgh, Pa. The company has done valuable work in experimenting with various aggregates and has published the results of its experiments, with excellent effect. Cement users are learning every day the importance of having the aggregates actually and literally clean, hard and well graded in size. Edward D. Boyer, formerly of Catasauqua, Pa., but now in New York, presented the report of his committee on Measuring Concrete, in the absence of Robert A. Cummings, the chairman.

At the Tuesday evening session, President Humphrey delivered his annual address before a large attendance. The address took the form of a

description of his trip abroad, when he inspected a large number of differing types of concrete construction. It was gratifying to learn that some of the aims of the N. A. C. U. are appreciated in Europe and that the Italian organization of cement users has adopted a number of the methods and procedures used by the American body.

L. C. Wason, Boston, Mass., chairman of the committee on Treatment of Concrete Surfaces, read his report. This was followed by a paper by F. J. Morse, Heath & Milligan, Chicago, Ill. Mr. Morse rather startled the convention by his frank statements in regard to concrete and concrete construction. His theme was "Cement Coatings," and he started a lively discussion by declaring that properly made concrete does not need protective treatment which is actually designed to overcome the effects of poor workmanship. This is always food for argument and a number of the members contributed thoughts on both sides of the question.

A program of technical papers was begun Wednesday morning, the session opening with the report of the committee on Reinforced Concrete and Building Laws, read by the chairman, A. E. Lindau, Chicago, Ill. An illustrated paper on "The Testing of Reinforced Concrete Buildings under Load" was presented by Prof. A. N. Talbot, of the University of Illinois, Urbana, Ill. The buildings upon which tests were carried out were the Wenalden structure in Chicago and the Turner-Carter building in Brooklyn, N. Y.

OLD OFFICERS RE-ELECTED.

The report of the work of the Association's executive board, showing much activity, was followed by the election of officers. All the old officers were unanimously re-elected, as follows:

President, Richard L. Humphrey, Philadelphia, Pa.; First Vice-president, E. D. Boyer, New York City; Second Vice-president, Arthur N. Talbot, Urbana, Ill.; Third Vice-president, E. S. Larned, Boston, Mass.; Fourth Vice-president, Ira H. Woolson, New York City; Secretary, Edward E. Krauss, Harrison Bldg., Philadelphia, Pa.; Treasurer, H. C. Turner, New York City. The place of the Association's next convention has not yet been decided upon.

Wednesday afternoon, a paper by F. J. Trelease, engineer of the Corrugated Bar Co., Chicago, Ill., was read by A. E. Lindau, in the author's absence. The subject was "The Design of Concrete Flat Slabs," and the paper, offering a number of new and interesting suggestions to engineers, was heard with great interest. Methods of testing concrete were described by W. A. Slater, assistant professor, University of Illinois, Urbana, Ill., and the session was brought to a close with the paper of James L. Darnell, manager of the Unit Construction Co., Kansas

City. Mr. Darnell outlined briefly a number of important pieces of construction in which the unit system was successfully employed.

Hon. Darius A. Brown, mayor of Kansas City, made a brief address Wednesday evening, telling the convention he was glad to have them as the city's guests. E. Lee Heidenerich, chief engineer of the Builders' Material Supply Co., Kansas City, followed with a paper on "The Design of Concrete Grain Elevators," something of interest to every agricultural community in the country. A foreign contribution by Dr. S. J. Trauer, city building engineer of Breslau, Germany, was read by President Humphrey, under the title of "The Design and Construction of a Reinforced Concrete Dome, 220 Foot Span." The description is of the largest concrete dome in the world, the construction of which presents a number of unusual features. It was illustrated with stereopticon views. President Humphrey also read the paper of Herbert W. Aldrich, engineer of the Consolidated Gas Co., New York City, on "The Suitability of Concrete for Gas Holder Tanks." This was illustrated also, and introduced an interesting discussion.

The session was concluded with a paper by Fritz E. von Emperger, consulting engineer, Vienna, Austria. Secretary Krauss of the Association had translated it into English and read the translation to the convention.

BUSY DAY THURSDAY.

Thursday morning was largely given up to a discussion of concrete bridges, a number of papers being presented. The first one read was by Walter Scott Gearhart, state engineer, Manhattan, Kans. Mr. Gearhart emphasized the vital necessity of having good bridges, since no system of good roads can be any better than the bridges which form an essential part of the highway. Daniel B. Luten, Indianapolis, Ind., followed with a paper on the general subject of "Concrete Bridges," which took up in considerable detail the design of arches. Both papers were illustrated.

Concrete roadways in the general sense continued to engage the attention of the convention at the Thursday evening session. First on the program was F. P. Wilson, city engineer of Mason City, Ia. Readers of CONCRETE are familiar with Mr. Wilson's work, one of his contributions being published in April, 1911. In his paper before the convention Mr. Wilson outlined the specifications according to which he has constructed excellent pavements in his own city. They will be found in another portion of this issue.

H. O. Eldridge, of the Office of Public Roads, Washington, D. C., read a paper at the same session under the title, "The Necessity for Good Roads." This had been written by Logan Waller Page, director of the Office of Public Roads and President of the American Good Roads Association, Washington, D. C. Director Page has for a long time been an active and valuable force in the nation-wide movement looking to improved highways and roads.

He believes thoroughly in the work he is doing and writes a paper that convinces. Hon. H. C. Gilbert, presiding judge, Jackson Co., Kansas City, Mo., gave an interesting talk on "The Necessity of National Aid in Good Roads."

Early Friday morning, John M. Meade, engineer, eastern lines, Santa Fe Railroad, Topeka, Kans., presented a paper on "The Design of Reinforced Concrete Retaining Walls," showing how necessary and economical is the use of concrete in railroad work. He was followed by Charles E. Sims, with a formal paper on "The Manufacture and Use of Cement Drain Tile," which will be published in a later issue. "Methods of Testing Cement Pipe," a paper written by Duff A. Abrams, University of Illinois, Urbana, Ill., was read by Prof. W. A. Slater, of the same University.

A pleasant feature of the convention was the banquet which was held Friday evening at the Hotel Baltimore. About 125 guests assembled and joined both in eating and in singing. Special songs were provided, being written and printed expressly for the occasion. There were parodies, and clever ones, on most of the popular favorites. One song, not on the formal program, but sung with repeated cheering, dealt with the actions of the alert and jocular grasshopper. It is too long to reproduce here, but no one who has ever heard it can forget it.

George H. Forsee, industrial commissioner of the Kansas City Commercial Club, was toastmaster at the banquet and he was witty and wise by turns. A Southerner by birth, he has a large stock of stories that are well worth hearing. He introduced as the first speaker John B. Pew, attorney, who spoke eloquently and appropriately and was followed by John T. Harding, also a member of the Kansas City Bar. Mr. Harding enlivened the evening by a number of stories. The third speaker was Rev. Fred V. Loos, who was not an inch behind the two lawyers in the wit and interest of his remarks. No speech was too long; none was dull. The banqueters may well feel that they had an unusual banquet experience.

LONG SESSION FOR SATURDAY.

Concrete products occupied the convention Saturday morning. Charles E. Sims, secretary of the Interstate Cement Tile Manufacturers' Association, Worthington, Minn., opened the program with a discussion of concrete tile. He voiced the opinion that the tile manufacturers of the country are ready to make standardized tile, but he pointed out the fact that specifications endorsed by the N. A. C. U. or other organizations must be such as take into consideration the practical matters of manufacture. For example, the committee of the N. A. C. U. recommends that the wall of tile larger than 22" in diameter shall be 1/10 the diameter. Mr. Sims feels that 1/12 is in many cases sufficient, and that the difference in percentage may be just sufficient to prohibit the manufacturer of concrete tile from competing advantageously with

(Continued on page 66)

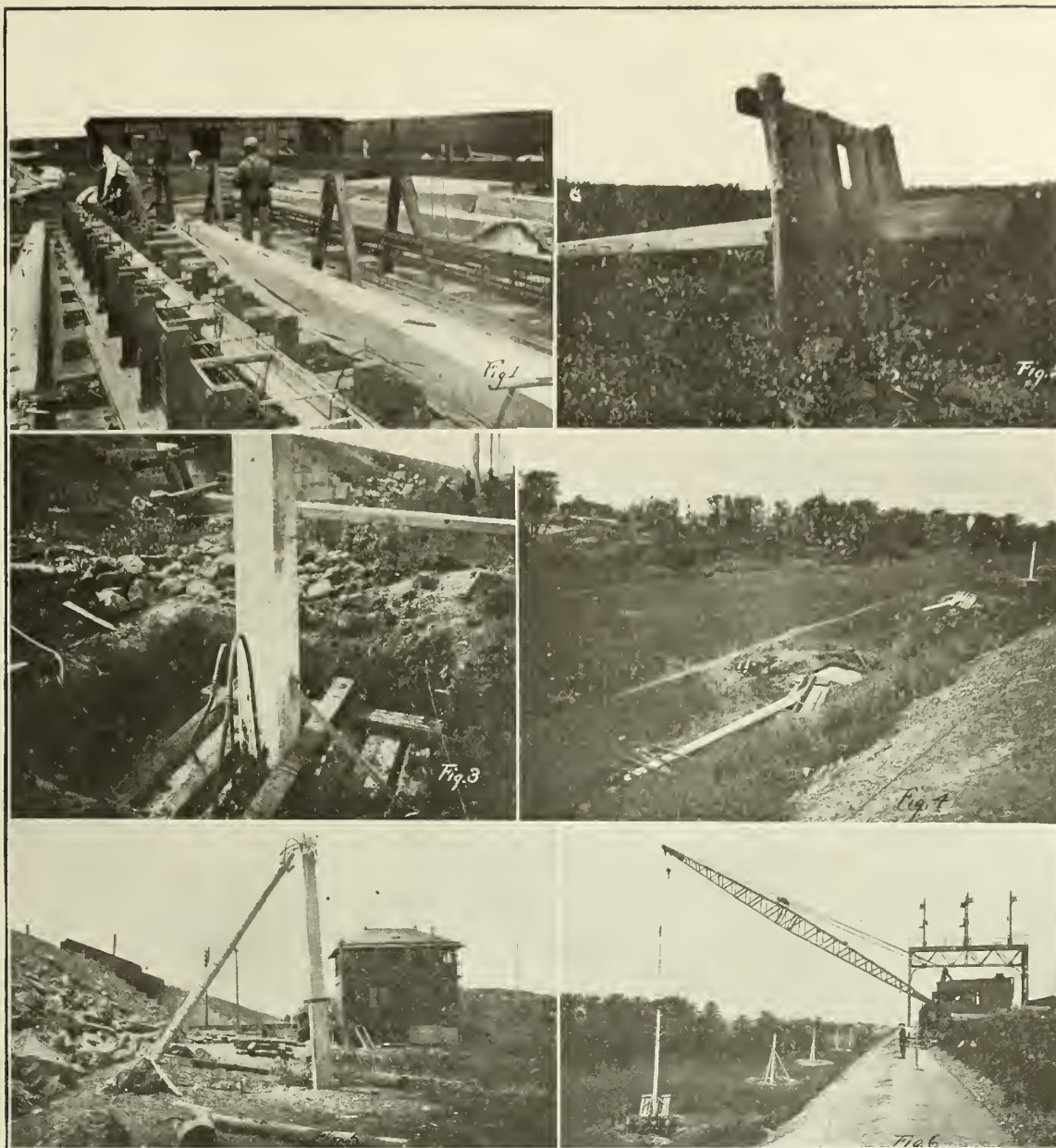


Fig. 1—Manufacture of concrete telegraph poles, showing skeleton frame suspended in place; frame in form, ready for pouring. Fig. 2—Concrete telegraph pole showing grillage foundation support and pit in marsh. Fig. 3—Setting and jetting down pole. Fig. 4—Position of pole line; poles to be set in foundation pits; excavation in foreground shows water-bearing character of the soil. Fig. 5—Test of concrete pole. Fig. 6—Erection of pole line; 90' boom derrick lifting pole over foundation pit.

Reinforced Concrete Telegraph Poles*

Design and Construction of Line For the Pennsylvania Railroad Through Marsh Land

BY GEORGE GIBBS,†

Among the facilities required on the New York Terminal division of the Pennsylvania railroad was the railroad company's telephone and telegraph service. The line for this purpose forms an extension of the New York-Philadelphia main line from its point of intersection with the Terminal division at the east side of the Passaic river near Newark, N. J., and consists of a pole line along the right of way across a continuous five mile stretch of semi-tidal meadow swamp

land known as the Hackensack Meadows, to the tunnel portal at Bergen Hill, the Hackensack river being crossed midway of the section. The ground surface is covered with a heavy growth of reeds, and the top stratum is a peaty bog, from 8' to 15' deep, underlaid with varying strata of clay, fine sand, and mixed sand and clay for very considerable depths. It will be seen, therefore, that the problem was to provide a design of pole which would not only be strong in itself, but which could be set in a stable foundation in a soft and uncertain ground. It was desired to make the line entirely secure against interruption by severe storms or by fires in the swamp reeds. It appeared, under these

*Presented at the eight annual convention National Association of Cement Users, Kansas City, Mo.

†Consulting engineer, Pennsylvania Railroad Co.

conditions, that the ordinary type of wooden pole would not be wholly satisfactory, either as regards strength for such a heavy service, or safety as regards the frequent meadow fires.

The use of reinforced concrete poles for the purpose appealed to us, but very little reliable data about either the cost of service from such design were obtainable. In Europe the author had observed the quite extensive use of concrete poles, chiefly for electric transmission purposes, but details of their construction were not at hand. These poles are frequently of structural steel covered with a protective coating of concrete, and sometimes are of wood encased in concrete, and much ingenuity has been expended in devising special forms of composite poles, but with what practical success it is difficult yet to say.

The desirability, however, of securing a strong fire-proof line across this section of our road was so great that the writer undertook to design in his office a simple form of reinforced concrete pole, which could be manufactured on or near the work and at a cost which would not be prohibitive. Without previous data to go upon the design evolved is somewhat experimental, and probably the notes here given will not be of very great assistance in fixing a precedent for an ordinary telegraph pole, as our conditions called for heavier construction than is usually required for such lines. The data, however, are given for what they are worth, indicating a heavy and difficult piece of construction for a special problem.

DESIGN OF LINE.

Two hundred and two poles were required, spaced from 70' to 135' apart, with an average standard spacing of 120'; the variations in span being due to numerous railway and highway crossings. The height of the top of poles above the ground also varies for the local conditions from 25' to 50', and the total length of poles from 35' to 65'. The loading called for an ultimate capacity of 60 open telegraph wires and two 40-pair telephone cables and one signal control cable. The open wires are of copper, Nos. 7 and 8 B. & S. gauge, and the cables Nos. 13 and 16 B. & S. gauge insulated wires, with a lead covering. The cables are carried by steel messenger wires. The weight of the wires and cables is $10\frac{1}{2}$ pounds per running foot, giving a total loading for the average span of 1,268 pounds per pole, or including cross arms, insulators, brackets and fittings, 1,500 pounds per pole. In addition to this static vertical loading, emergency conditions were assumed of an extra loading of a half inch of ice on the wires and a wind pressure of 8 pounds per square foot on wires and 13 pounds per square foot on the poles, the stresses under these conditions not to exceed the elastic limits of the wires and of the carrying structures. These assumptions are equivalent to a vertical loading of 7,600 pounds per pole and a horizontal force of 4,000 pounds exerted one foot below the pole top. The normal sag of the wires at 60 degrees Fahrenheit temperature is $4\frac{1}{2}$ " and a normal tension of 273 pounds for No. 8 wires and 130 pounds for No. 9. The maximum hot sag at 130 degrees Fahrenheit is 11"; the tension in the wires under maximum wind pressure with the ice loading and at 20 degrees Fahrenheit, is

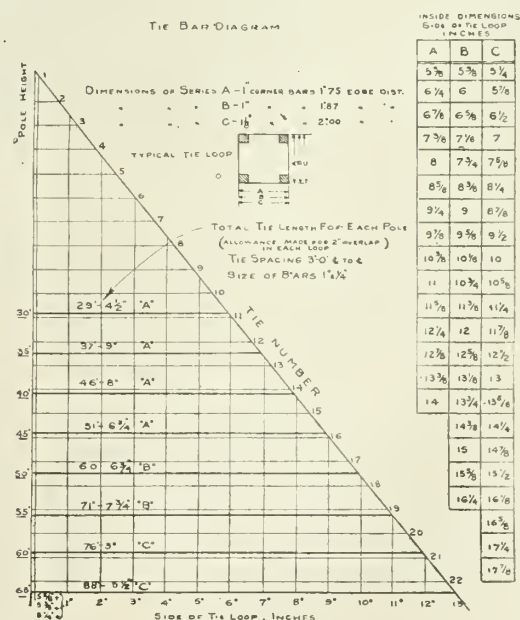
702 pounds and 470 pounds respectively for the two sizes of wires.

The design adopted is that of a tapering smooth-surface, reinforced concrete pole, square in cross section with chamfered corners and having a taper of $\frac{1}{2}$ " in 5'. The concrete is of $1\frac{1}{2}$:2:4 mixture, assumed to have an ultimate strength in comparison of 2,000 pounds per square inch. The reinforcement is composed of mechanical bond bars tied together into a square skeleton frame, and in the complete pole this reinforcement is covered by a 1" minimum thickness of concrete. The following table gives details of the complete construction.

TABLE OF CONCRETE POLES.

Length	Equivalent Pull 1 Ft from Top	Edge Steel Distance for	Area Steel	Extreme Fiber Stress in Concrete Compression	Unit Comp. Stress in Steel	Weight of Pole	Cu. Concrete	Weight of Steel, lbs.	Lin. Ft. of Wire wrapped around Pole
30'	4866	1.75	3.38	1953	19059	5000	33.15	819	228
35'	4321	1.75	3.63	2087	20460	6200	41.44	1077	273
40'	4505	1.75	4.03	1917	19667	7600	50.75	1309	333
45'	4647	1.75	4.40	1987	20428	9200	61.56	1493	375
50'	4763	1.87	4.73	1886	19692	11000	73.24	1792	431
55'	4860	1.87	5.00	1832	19155	13000	86.58	1974	490
60'	4945	2.00	5.30	1812	19083	15000	101.28	2249	553
65'	5020	2.00	5.48	1976	18591	17600	117.23	2575	618

In order to manufacture the poles economically a yard was established adjacent to the right of way and with side track connections for delivery of materials. The ground was leveled and set with stringer pieces, three feet apart, of old wooden car sills, so as to furnish a convenient surface upon which to erect the timber forms. This yard permitted the simultaneous



proper height above the ground and the sectional wooden frame put in position around it. The concrete mixture is then poured in and carefully tamped. In this way six poles were made per day and were left in place at least sixteen days to season.

FOUNDATIONS.

After a number of experiments it was found best to set the poles in pits excavated in the marshy stratum. These pits were generally about 9' square and 5' deep, and a timber grillage was placed around the base of each pole, and about 5' below the top of the ground. This grillage consisted of six track cross-ties bolted together and to the pole, and partly planked over by 3" rough lumber. (See Figs. 2, 3 and 4.) The pole, which projected below the grillage and was pointed at the butt, was jetted down by compressed air into the sandy layer, so that the grillage would rest at the bottom of the pit. The pits were then back-filled with rock and clay. Poles on curves are cross-guyed, and the terminal and railway crossing poles are head-guyed with steel cables.

In order to determine the stability of the foundations, as above described, as well as the transverse strength of the pole itself, a test was made of a 55'



Fig. 7—Concrete telegraph pole line over Hackensack Meadows, New Jersey.

pole set in a 13' deep foundation. See Fig. 5. The test consisted in applying a horizontal pull 39.5' from the ground. The breaking load was 4,360 pounds and the point of fracture 20' from the ground, at the top of the 32' reinforcement bars. The foundation itself was found to be amply secure.

COST.

The actual cost of labor and material for the manufacture of these poles, reduced to a unit, cost for an average length pole of 40', weighing 7,600 pounds, was as follows

Forms—labor and material	\$19.00
Concrete—labor and material	26.50
Reinforcement—labor and material...	32.00

Total per pole.....\$77.50

The above does not include cost of preparing site, engineering, etc., and is for the bare poles (without fittings or foundation timbers). To obtain the cost of the poles erected there must be added the cost of load-

ing, distribution, foundations and setting, cross arms and fittings, but these items were special to the particular location and would be of little use as a matter of general information. It might be stated, however, that the cost of handling and erecting these heavy poles was considerably more than would be the case for wooden poles; furthermore, care must be taken in loading and unloading them and special appliances are required for their erection. See Fig. 6. In Fig. 7 is a view of the completed line.

In the special case in question it was figured that the cost of the line erected complete was not greatly in excess of that of an equally stable wooden pole line, as in order to meet such a condition it would have been necessary to employ "H" frame poles and set them in equally expensive foundation pits. In the case of this line it is interesting to note that the foundations and setting cost considerably more than the poles themselves.

To sum up, it may be said that for the particular case of this heavy line having very difficult foundation conditions, the use of a reinforced concrete pole resulted in a durable, safe and neat appearing construction at little additional cost to that of a wooden pole line inferior in all these respects. For the lighter class of telegraph lines, however, the writer would anticipate that concrete poles would always cost more than the wooden pole construction, as ordinarily designed and erected.

L. V. Morris, Chief Engineer Jamaica Improvement of the Long Island Railroad Co. has lately designed and manufactured a number of reinforced concrete piles to be used as station platform shelter supports. These piles are 23' in length and probably represent fairly well a telegraph pole of ordinary dimensions and strength. The writer, therefore, gives, with Mr. Savage's permission, some information regarding them, as a matter of general interest, and for comparison with the heavy poles previously described. These piles are 28' long, of hexagonal cross section, tapering from 16" at the butt to 8" at the top. The reinforcement consists of eight $\frac{1}{2}$ " square twisted steel rods with a hooping of No. 7 wire wound on spirally, the $\frac{1}{2}$ " rods being attached to a tapered mandril. At various points the hooping and the rods are wired together to secure the frame and prevent distortion. The piles contain slightly under one cubic yard of concrete and weigh about 3,700 pounds, or an average weight of 132 pounds per foot. This compares with 190 pounds per foot for the Terminal division telegraph poles. One of these piles was recently driven to a depth of about one-half its length and refused to go further, although a thousand blows of a steam hammer were delivered at the head, no appreciable effect resulted from this rough treatment.

Through the unfortunate "dropping" of a line from page 34, March, 1912, issue of CONCRETE, credit was not given, as was intended, to the Trusswall Manufacturing Co., Kansas City, Mo., for information and illustrations as to the use of Trusswall columns.

Specifications Used In Successful Concrete Paving In Mason City, Iowa*

BY F. P. WILSON,†

In this paper I have endeavored to describe to this association my experience and the methods I have used in constructing first-class Portland cement concrete pavements in Mason City, Ia.

In the last five or six years I have made a broad study of concrete paving and have visited a large number of cities in the Northern states where this class of pavement has been laid and I have watched the methods of construction in detail.

It is my opinion that the laying of a concrete pavement, properly put down in an up-to-date manner with first-class cement, good, clean, sharp sand, and good, clean, hard stone, with proper allowance made for expansion and contraction, certainly is warranted on account of its first cost, cheapness to maintain, cleanliness of the streets, and the small expense to repair when it becomes necessary to cut holes.

In the summer of 1909 the city of Mason City, Ia., laid 6,000 square yards of concrete pavement in the down-town district, where it would be tested under heavy traffic. At this time, after standing the severe test of two winters and heavy traffic, also the cold of this winter to date, the pavement is in as good a condition as the day it was finished.

In the year 1910 22,000 square yards were laid. The last season (1911) 45,000 square yards were laid, and at this writing contracts have been let for 50,000 square yards, which the city expects to have laid this coming summer. A total of 70,000 square yards has been laid in Mason City, Ia., to date, at a total cost of \$114,378.96, including the concrete curbs.

In constructing a first-class concrete pavement, the first requirement is to have strictly first-class material; secondly, to have a first-class, up-to-date set of plans and specifications, and, lastly, a rigid and close following of these specifications in every detail.

The following are the specifications in detail which I have used in the construction of all concrete pavements laid in Mason City, which have proved entirely satisfactory:

PREPARATION OF ROADBED.

All streets, prior to laying any pavement thereon, shall be graded so that the pavements will be at the established grade when completed. After excavating to sub-grade, unless the engineer deem the natural ground a proper foundation, excavation shall be continued until solid ground is reached and then refilled to sub-grade with sand, gravel or broken stone. The contractor shall be required to remove at his own expense all obstructions, such as trees, old blocks, debris, etc.

EXCAVATION.

All excavated material, gutter stones, planks, macadam, crossing-stones, old curbs, surplus earth, etc., shall be the property of the city and be deposited by the contractor in such place and manner as shall be directed by the engineer, the distance not to exceed 3,000'. No plowing will be allowed within 3" of the bottom of the foundation.

ROLLING.

When the street shall have been graded and shaped to its proper form, it shall be thoroughly rolled with a 10-ton

roller to a thoroughly compact surface. If the ground is wet, sand or gravel is to be put in before rolling.

Any depression discovered after this rolling shall be refilled to sub-grade, re-rolled, and this repeated until a roadbed, perfect as to grade and form, shall have been made.

TAMPING.

When the use of the roller is impracticable, the foundation must be thoroughly puddled and rammed until compacted to the satisfaction of the engineer.

CONCRETE FOUNDATION.

Upon the roadway thus formed will be laid Portland cement concrete 5" thick, to be made as follows: One part by measure of Portland cement; two parts by measure of clean, sharp sand, and five parts by measure of broken stone.

The sand and cement shall be thoroughly mixed into mortar at the proper consistency with a batch mixer approved by the engineer. Broken stone, thoroughly cleaned of dirt, drenched with water, but containing no loose water in the heap, shall then be added to the mortar in the proper proportion. The concrete will then be turned and mixed until each fragment is thoroughly coated with mortar, a strictly wet mixture being required. The concrete thus mixed shall have such a consistency that when rammed the mass will not shake like jelly, but will, when struck, compact within the area of the face of the hammer without displacing the material laterally.

The concrete thus prepared shall be placed immediately in the work. It shall be spread and thoroughly compacted until free water appears on the surface, which shall be made smooth and parallel to the surface of the finished pavement. The whole operation of mixing and laying each batch of concrete shall be performed in an expeditious and workmanlike manner and be entirely completed before the cement has begun to set.

No retempering of concrete will be permitted, and concrete in which the mortar has begun to set will be rejected.

The thickness of this concrete to be 5" after it has been compacted.

Extreme care should be taken that the sub-grade is kept moist while this concrete is being put in place.

No concrete shall be laid when the temperature at any time during the day or night falls below 35° above zero, Fahrenheit.

WEARING SURFACE.

Upon the concrete heretofore specified shall be immediately laid a wearing surface 2" in thickness, to be made as follows: One part by measure of Portland cement, and two parts by measure of coarse, clean, sharp sand; the sand and cement shall be thoroughly mixed into mortar of the proper consistency with a batch mixer approved by the engineer.

Before this mortar has begun to set it shall be finished off to a smooth surface with a wood float, and, before completely hardened, it shall be roughened by brushing with a stiff vegetable brush or broom. The curvature and cross sections of the pavement to be made according to the plans.

REQUIREMENTS OF MATERIALS

The cement used in the work shall be submitted to the tests approved and recommended by the American Society of Civil Engineers, which it must stand to the satisfaction of the engineer.

All Portland cement used in the work shall be Mason City Portland cement or other Portland cement equally as good, which shall be protected from the weather, free from exposure to air slacking and from moisture until used.

The sand shall be clean, sharp sand.

The stone used for the concrete shall be of the best quality of hard lime stone, or other stone equally as good, and shall be broken to such a size that the fragments shall not be larger than will pass through a 1½" ring and not smaller than a hazel nut. It shall be free from dust, dirt, loam or other objectionable material and shall be screened, when necessary, over a one-half inch screen to eliminate dust and small particles.

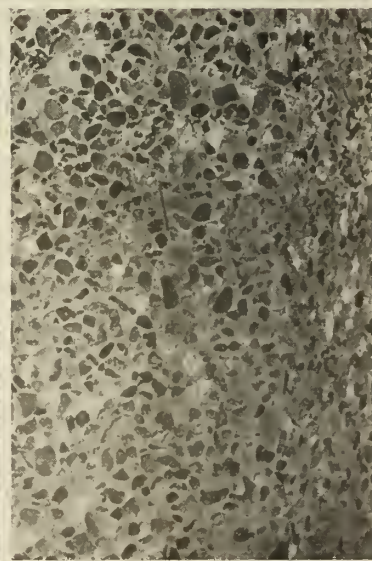
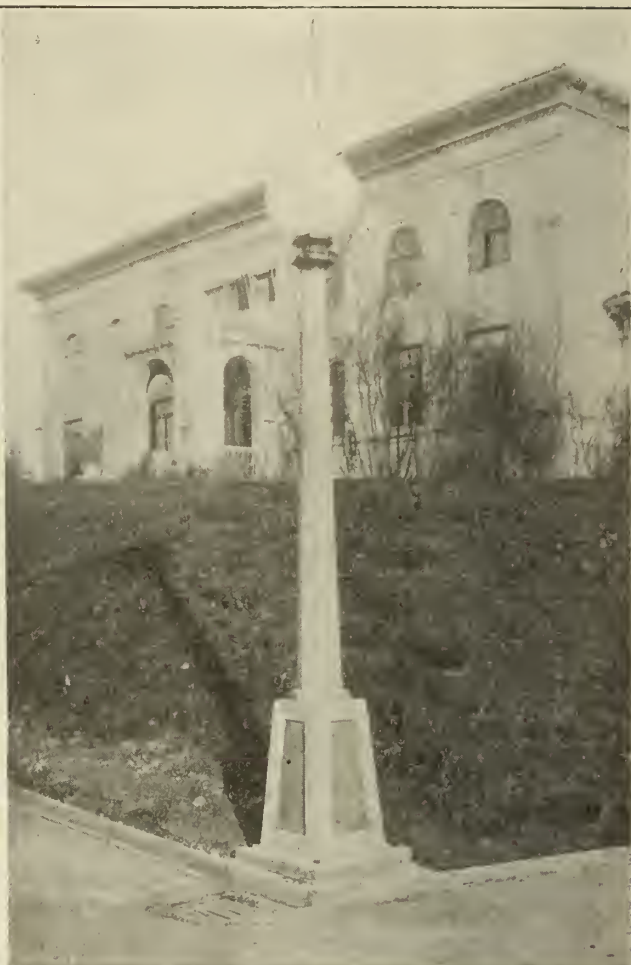
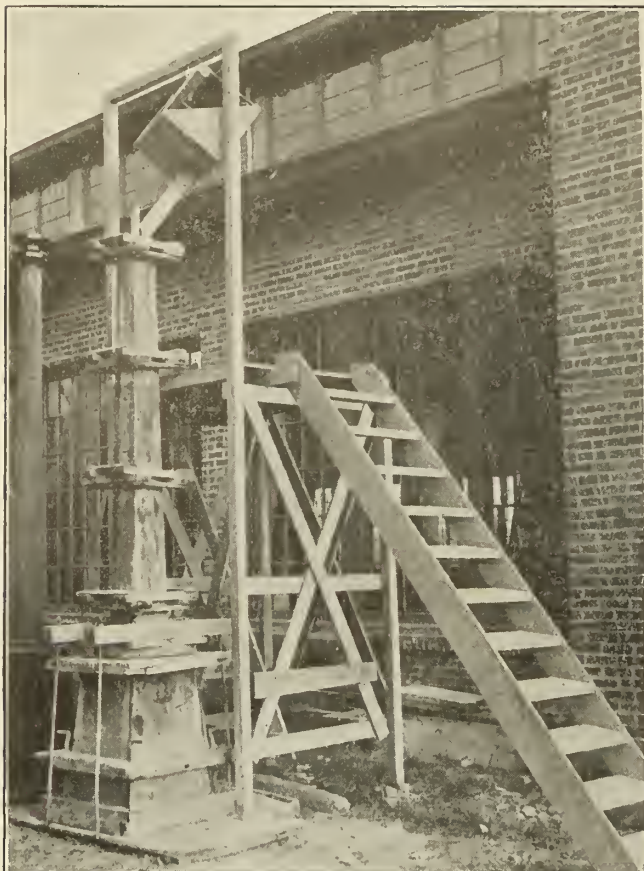
EXPANSION JOINTS.

An expansion joint 1" in width shall be left next to the curb on each side of the street or alley, also an expansion joint ½" in width shall be left every 25' across the pavement at right angles to the curbs. Said expansion joints are to be filled with an asphalt paving filler of

(Continued on page 70.)

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo.

†City engineer, Mason City, Ia.



Erect Form Used in Casting Lighting
Posts
Post Remains Erect and is Conveyed to
Site on Special Wagon

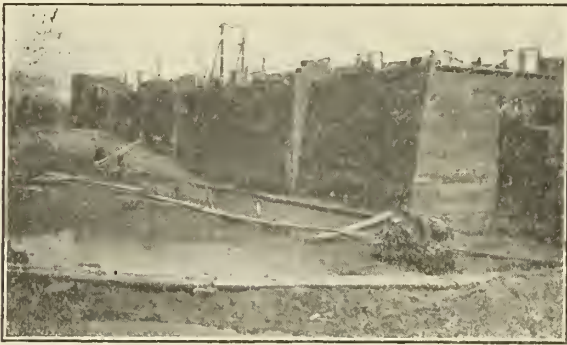
Concrete Post in Service
Close View of Acid-Etched Surface of
Concrete Post

Heavy Concrete Construction Without Coarse Aggregate.*

BY EVERETT B. MURRAY.

The general acceptance of the statement that concrete is a composition of stone, gravel, cinders or other aggregate, mixed with sand and cement, has been taken by a great many people to mean literally what it says. And hence innumerable people have the idea that unless the above ingredients are used, the resulting mixture will not prove stable. The writer does not wish to infer that the best results can be arrived at from any other than the mix as described above, but wishes to describe a piece of work where a departure was made, and where the results were very satisfactory.

The job under consideration was the construction of a pumping station, situated on the Illinois river, in the central part of Illinois. The contractor had



Concrete Construction Using Coarse Sand and Cement

simply made a superficial examination of the site before bidding, and on his arrival there after the contract was awarded he discovered that the gravel bank he had counted on using was almost entirely composed of very coarse sand. It was apparent to both the contractor and engineer that something had to be substituted for the stone, as the cost of getting stone to the site meant an increase in the amount of the original contract. This was owing to the fact that all materials had to be floated or towed down the river by barges.

After a close investigation had been made of the bank, it was found that the sand was very clean, sharp and coarse, almost a very fine gravel. And after tests of various mixtures had disclosed that it developed a strength that would warrant its use, it was decided to use it.

The entire monolithic wall around the building, as well as the pump, engine, and boiler foundations, discharge and intake bays, were poured, using only the material obtained from this bank. The total quantity was about 300 cubic yards.

It is true that more cement had to be used than an ordinary 1:2:4 or 1:3:6 mix would have called for, but under the existing conditions, and the price of

cement, it was found cheaper to use the excess cement than to barge the stone. Owing to the fact that the sand was not running uniformly, due to streaks of gravel in it, the proportion of the mix had to vary accordingly, but the average proportion used was a 1:4.

The writer, who was inspector and resident engineer, had to leave before the job was entirely completed, but up to that time the entire amount of concrete that had been stripped and exposed, had given every indication of being as good as if stone had been used in the mixture.

The same principal holds good in this case as with the normally mixed concrete, that is, each particle of sand must be covered with cement, and the spaces between filled with cement. So that it appears at once that the per cent of voids must be exceptionally small. The writer was not in a position to make accurate absorption tests, and consequently is not able to state definitely just what that per cent is, but would be glad to hear from any one who has had a similar experience and tested the mix thoroughly.



The building shown in the illustration was erected in Cave Springs, Ark., by J. H. Eichman, for Stroud Brothers. Each of the two stores in the building is 25'x60' and the lower story of the building is 12' high and the upper story 10'. All concrete block were made wet of a 1:5 mixture for the backing, and a 1:2 mixture for the facing. The block were made on Dunn machines. The 4" course of block was made in Simpson lattice molds. Other special pieces were made in wood molds which were constructed in the factory of the Cave Springs Construction Co., of which Mr. Eichman is manager. The columns are built up of 12"x12" hollow block with four corrugated bars in the core, which was afterward filled with slush concrete. These bars extend 16" into the lintel above. The lintel is 8"x22" and 50' long, with an expansion joint in the center. It is reinforced with five 3/8" corrugated bars and two 1/2" smooth bars, wired together. The two 1/2" bars are in the top of the lintel and the heavier reinforcing is in the bottom. Joplin chats were used on all the concrete work. The building is covered with Vulcanite roofing and the total cost of the structure was \$4,500.

*The matter presented here by Mr. Murray as to concrete without a coarse aggregate, will interest a great many readers of CONCRETE. We would like to learn of experiences of readers of the magazine in any experiments which they have made along this line.—Editor.

Building a Reinforced Concrete Mausoleum

Details of Structure Erected at Mankato,
Minnesota, Are Described and Illustrated

BY E. B. SCOTT

The construction and design of concrete mausoleums is becoming an interesting work of architects and engineers. The buildings which the writer will describe were designed and constructed under the supervision of Jean Bart Balcomb.* These buildings are entirely of indestructible material. This description refers more particularly to a mausoleum built at Mankato, Minn.

These structures are all built after a standard design; that is, they are built in sections, and by increasing or decreasing the number of sections it is easy to construct a building of any capacity. Each section is made up of fifty crypts. The building at Mankato, Minn., is a three-hundred crypt building with space being taken out for rest rooms and receiving vaults, which leaves space for two hundred forty crypts.

The excavation for the foundation walls consists of a trench 16" in width and 3' to 5' in depth, according to frost condition. The trenches in this case were dug

poured. The joint is made by placing a couple of layers of tar paper between the old and the new walls.

The expansion joints allow the walls to act separately under their respective loads and thus relieve the



Interior View



Concrete Mausoleum

to a depth of 4' below natural surface. The trenches were dug and forms set for each side of the building and well filled with concrete to the grade line. Water was encountered below the surface but was taken care of by tiling in the vicinity and also by placing 8" tile under the walls and draining to a nearby waterway. The walls at the bottom were allowed to spread to the width of about 2' and were reinforced horizontally with $\frac{3}{4}$ " corrugated bars. At the top of the wall three $\frac{3}{4}$ " corrugated bars were placed horizontally so as to form a continuous bond around the whole building; $\frac{3}{8}$ " corrugated bars 2' long were placed 1' apart vertically around the entire building, and these extend up above the finished wall about 12". These bars tie the walls of the building to the foundation as can be seen by reference to a transverse section. There are expansion joints at the rear and the front of the building. (See foundation plan.) The wall between these joints are cast after the side-wall foundation has been

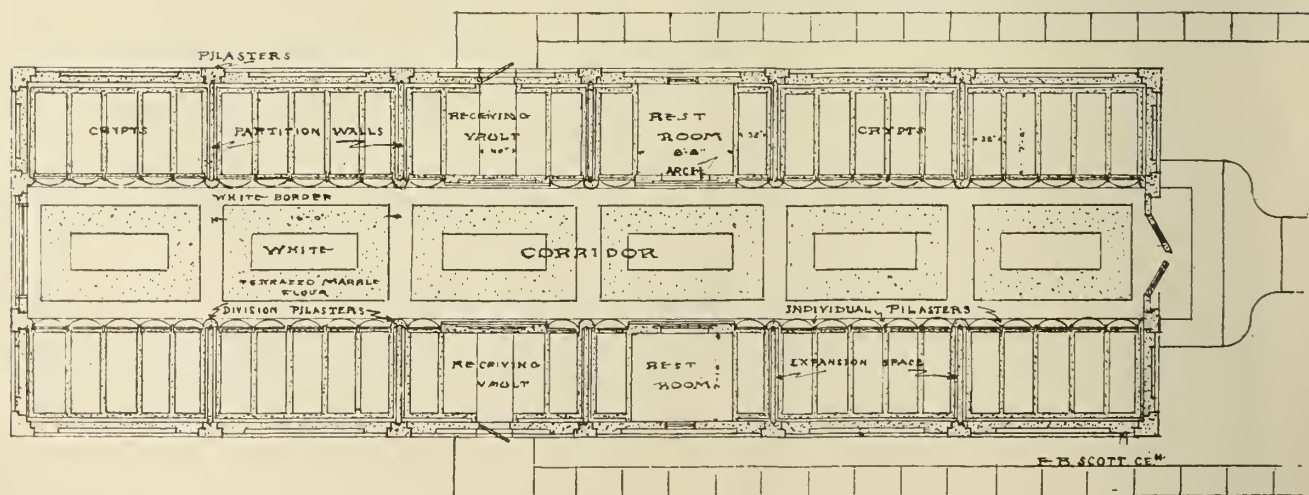
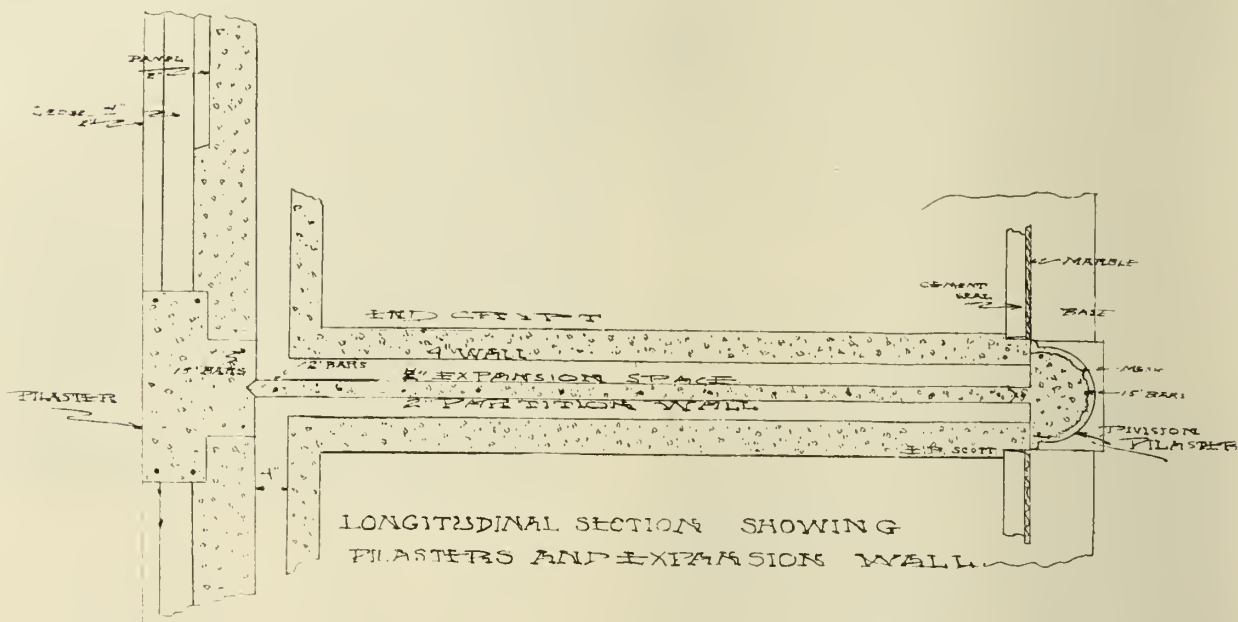
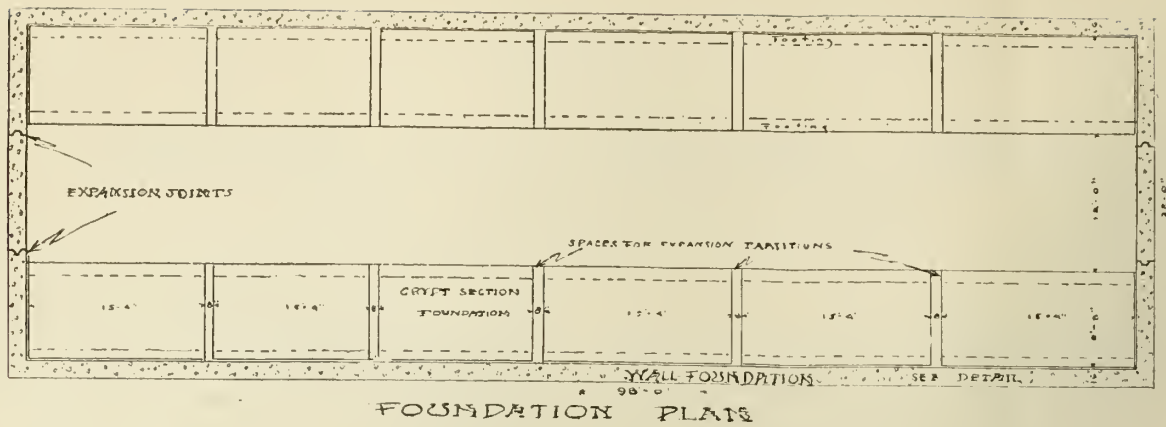
side foundations and allow them room to expand and settle.

CRYPT FOUNDATIONS.

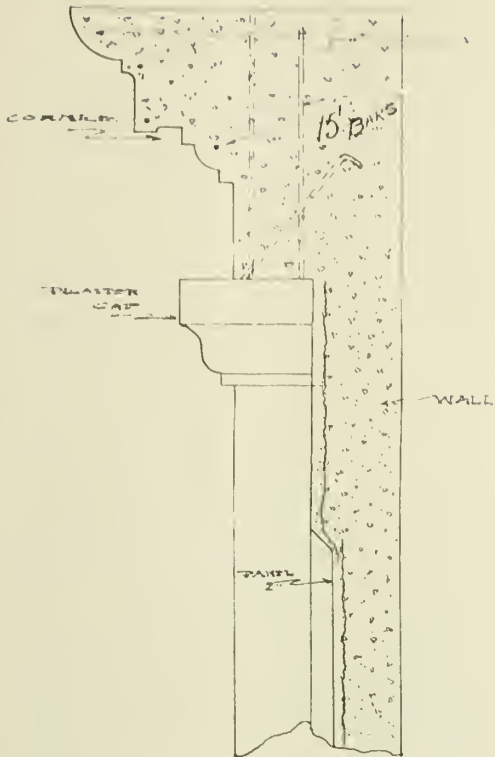
After the wall foundations are poured the crypt foundations are cast. In this particular case two walls 1' thick and resting on the natural surface were run the length of the building and at 10' from each side at a grade of 6" higher than the wall foundations. These walls were heavily reinforced both vertically and horizontally with $\frac{3}{4}$ " corrugated bars. The vertical bars were later bent over and formed horizontal ties into the crypt footing slab which is cast upon the wall and the foundation wall, as can be readily seen by reference to the foundation plan. The finished crypt footing and foundation is 10" above grade line of wall foundation. The reinforcement consists of $\frac{3}{8}$ " corrugated bars placed 1' apart both ways in the horizontal plane. The principle is similar to a roof slab over two supports with a distributed load.

These crypt foundation slabs were poured at the rate of two slabs per day, with a gang of six men. This included setting and removing forms. A mixture of 1:3:5 was used throughout for the foundations. It should be stated that the slabs were not poured until all the filling had been done in between the walls. The forms for the foundations were made of wood and wired in place. These were the only forms required to be made on the job. The rest of the forms were factory made. The foundation completed, the inside base was next poured. This was cast 8" above the floor line, it being the bottom or floor of the first crypt. The division pilasters and individual pilasters all have their foundations on this base. The base was cast

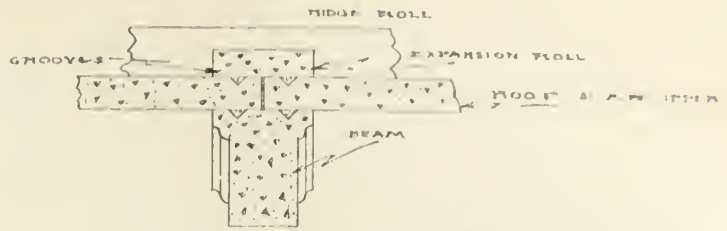
*Consulting Engineer, Iowa Mausoleum Co., Waterloo, Ia.



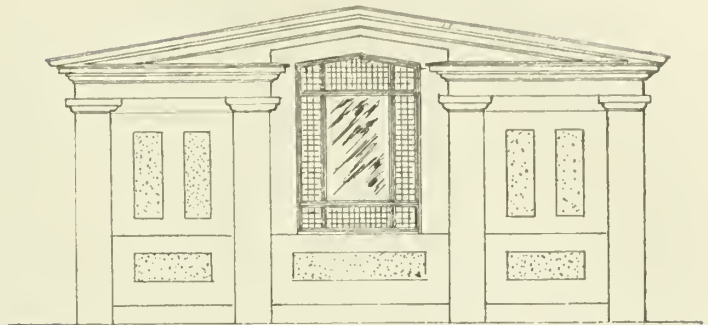
FLOOR PLAN
MAUSOLEUM



VERTICAL SECTION
OF
WALL AND CORNICE



SECTION THRU UPPER ROOF
AND BEAM



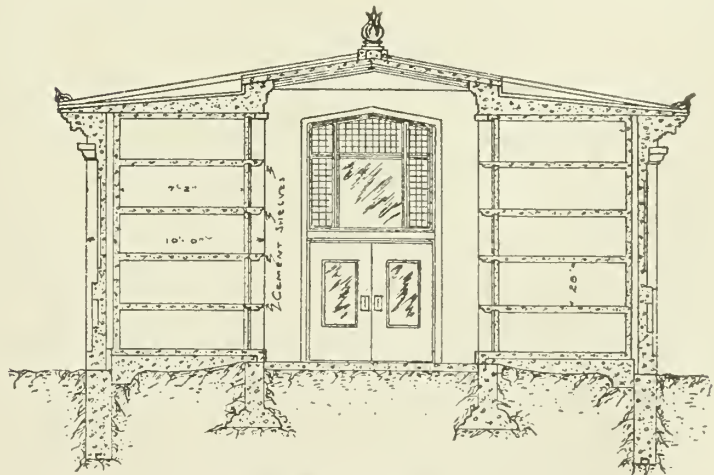
-REAR ELEVATION-

with one continuous pour so as to show no cracks or seams.

As fast as the bases were cast the next operation was to pour the exterior pilasters. Beginning at the rear of the building the steel forms for the two exterior end pilasters, the two exterior corner pilasters, the two exterior side pilasters, the two interior division pilasters and individual pilasters were erected. These forms represent, when set up, one section of the building. They are all fastened together by angle irons which are cut so as to hold each form in its correct place. These forms are so constructed that they are interchangeable and can be taken down and used again on the next section of the building.

Each exterior side pilaster has a face of 24" and is 14" thick, poured to the height of 12'. They are reinforced vertically with six $\frac{3}{8}$ " corrugated bars 15' long, and at the back they are reinforced horizontally by $\frac{3}{8}$ " corrugated bars 2' long, placed 1' apart, tying the pilaster to the partition wall. This partition wall ties the interior division pilaster by the same means, thus holding both interior division pilasters and exterior side pilasters rigidly. This wall also separates one section from another.

The forms for the side and the interior division pilasters are made in sections at the back,



-TRANSVERSE SECTION-
-SHOWING CRYPTS-
-LOOKING TOWARD THE FRONT-



DETAIL OF LOWER ROOF

so that the concrete can be easily poured and spaded. The exterior corner pilasters are reinforced vertically with eight $\frac{3}{8}$ " corrugated bars 11' long and horizontally by $\frac{3}{8}$ " corrugated bars 2' long which tie in the pilasters to the side and end walls. The forms for the corner pilasters are constructed so that the face has no seams, but the back is made in sections which makes it easy to erect and look after the pouring of the concrete.

The end exterior pilasters include part of the inside division pilasters. (See the plans.) The exterior part is reinforced with only seven $\frac{3}{8}$ " corrugated bars 15' long, while that part of the division pilaster which shows on the inside of the building is reinforced with a metal lath or wire mesh. This pilaster is tied both to the end walls and to the side walls of a crypt. The exposed parts of the concrete of these pilasters are taken care of by a continuous steel form at the face, while the back is built in sections so that it can easily be removed after the concrete has set.

The individual pilasters are merely a part of the crypt side walls. They are cast the height of five crypts, 13' 4", being reinforced vertically with one $\frac{3}{8}$ " corrugated bar 15' long, and horizontally by twelve $\frac{3}{8}$ " corrugated bars 1' long, placed 1' apart. The 1' bars tie the individual pilasters to the side walls of the crypts. The individual pilaster forms have a face free of seams, but at the back they are built in sections which makes it possible to fasten the crypt side wall forms to them and cast the concrete which fastens the individual pilasters to the crypts. These individual pilaster forms, when drawn from the concrete, leave a very smooth and finished piece of work.

Beginning at the rear of the building the end walls are poured the height of the outside pilasters. These walls are reinforced with metal lath and with $\frac{3}{8}$ " corrugated bars, which tie the walls to the pilasters. The wall forms are made of wood. The front consists of four sections, while the back is made up of five sections. These are fastened together by bolts and are thoroughly braced by diagonal braces to the ground, which prevent the concrete from pushing the forms out. Wires hold the back form to the front form.

Starting at the bottom of the wall it is 14" thick to a height of 1', and from 1' in height up to 5' high, the wall is 10" thick with a panel 4" deep. From the 5' height to 12', or just below the pilaster cap, the wall is 6" thick with panels 2" deep. This wall is fastened to the foundation by corrugated bars which were placed in the foundation when it was cast. The side walls are similar, with the exception that they are longer and include more panels. They are all reinforced with $\frac{3}{8}$ " corrugated bars and with metal lath.

Between the end pilasters at the rear the wall is carried up to a height of 5', and then the concrete window frame, which has been previously cast, is placed in its position on this wall. The forms are then placed between the end pilasters and the window frame, and

the concrete is poured to the height of the pilaster caps. The concrete walls then securely hold the concrete window frames in place. These frames are cast in a wooden form about thirty days before they are needed.

While curing they are kept out of the sun and are also kept damp by placing wet cloths over the forms. These forms are so made that they can all be taken apart, making it an easy matter to draw the frame from the form without checking or injuring the concrete in any way. The frame is reinforced with $\frac{3}{8}$ " corrugated bars all around.

After the end walls are poured the side walls are next started. The forms are placed between the first two pilasters at the rear of the building, and as fast as the concrete has set, the forms are removed and placed in the next section until all the walls are completed.

With the walls completed, the pilaster caps are cast. They are fastened to the pilasters by vertical bars which extend up through the pilasters. On top of the walls is next cast a strip 10" high by 8" thick which leaves the wall the same height as the pilaster caps and also puts it in shape to receive the cornice.

While the walls are being completed, work is carried on inside the building, such as pouring the partition walls and casting the crypts. The partition walls are poured to a height of 32", then the form is moved up and another 32" section is cast. In all, it takes five pourings to complete the wall.

The forms are made of steel and in two parts. They are fastened together by bolts with spreaders between the forms. These spreaders remain in the concrete and the lower bolt of the form changes place with the upper one when the form is raised. The crypts are cast almost in the same manner. The side walls are connected with the individual pilasters and these are fastened at the back by end wall forms. These forms are poured to a height of 32", placed so that five crypts can be poured at one time. The forms are similar to those used for partitions. After the walls are cast to a height of five crypts the floors are next cast in the crypts. The holes made by the spreaders in the walls are taken care of by placing reinforcing rods in them which bind the floors of the crypts to the walls.

The crypts are 28' high, 32" thick and 7' 2" long, inside measurements. Their walls are 4" thick with panels 1" deep. The sides are cast first, then the crypt floors are poured. The floors have mesh and bar reinforcement, while the side and the back walls have $\frac{3}{8}$ " corrugated bars only.

The walls having all been poured to the height of the pilaster caps, the next step is to cast the exterior cornice. This is done in four pourings, and in 16' sections. It is fastened to the walls by reinforcing rods which extend out of the walls and pilasters. (See detail of cornice.) The cornice completed, the next pour is the lower roof slab, which is the interior cornice. This cannot be cast until one section

of crypts is completed. This lower roof slab is heavily reinforced at the interior cornice with $\frac{3}{8}$ " corrugated bars. Sufficient space is left between each pair of 16' slabs for expansion. This expansion space is covered by the expansion rolls. (See details.)

The upper roof beams and slabs are next poured in 16' sections. The joints are covered by the expansion rolls. A waterproof paint is used, dull finish outside, enamel finish inside. The terrazzo floor is poured in panels, a white border being first and then the dark panels. It is 6" thick. The first pour is a 1:5 mix, and the second pour consists of one part white cement to two parts white sand and fine gravel, or two parts white sand and marble chips, laid $\frac{1}{2}$ " thick. The base of $5\frac{1}{2}$ " concrete underneath is a 1:2:3 mixture of washed and screened sand and gravel. The top is either finished by hand or by a machine, but in either case it is ground down to a sufficient depth to produce a first-class surface.

The building as completed is 98' long and 32' wide, and each of the six sections is 16' long by 32' wide. A corridor 12' wide extends the whole length of the building, while a space 10' long is devoted on either side to building the crypts and walls. The outside walls are 12' 10" to the top of the epistyle caps, with a cornice 2' 6" high.

The light for the building comes from both ends through large prism glass windows and the plate glass in the doors. Some light is admitted to the corridors by the windows in the rest rooms.

The cement seals are reinforced with metal lath and corrugated bars; they are paneled very deep and do not weigh more than 80 pounds apiece. They are $33\frac{1}{2}$ " x $29\frac{1}{2}$ " and 3" thick. Two edges have grooves and are beveled so that they can be fastened in with cement mortar. These are placed over the opening of the crypt, and the marble slab is fastened to it by cement and plaster of paris when permanently sealed.

The doors are cast previous to setting up in building. The fixtures consist of bronze hinges and locks and beveled plate glass.

Some Reasons for Interest in Good Roads

Reasons for an interest in good roads are set forth in a pamphlet distributed by the Ohio Good Roads Federation, as follows:

If you are a farmer, because your farm will increase in value, you can raise more profitable crops, your cost of hauling will be lower, you can market your products when prices are best, your children can get to school, your family can attend church, your physician will be in closer touch with you, your boys and girls will stay on the farm, you will have better mail service, more social life, and happier condition all around.

If you are a merchant, because good roads enlarge your trading radius, and make it possible for purchasers to reach you every day in the year, and thereby increase your sales.

If you represent a chamber of commerce or a board of trade, because the public roads are commercial

feeders to the city, and every improvement of these roads means a greater prosperity to the cities through increased agricultural production and greater stimulus to all industries.

If you are a highway official, because you are striving for better methods of road construction and maintenance, and more efficient road administration.

If you are a railroad man, because improved roads mean greater production, consequently more traffic, prevent freight congestion, bring more industries, more roads, more tourists.

If you are an automobile user, because you can get the benefit of your machine every day in the year, your repair bills will be lower, longer and better tours will be possible at all seasons of the year.

If you are a dealer in farm products and implements, because you can receive the products and deliver the implements at all times.

If you are an automobile manufacturer, because every mile of improved roads means a greater demand for both pleasure and commercial cars, increases wealth, and consequently the power to purchase.

If you are a manufacturer of road machinery or road materials, because road improvement means more business.

If you are the proprietor of a hotel, because improved roads mean more tourists and more commercial travel. New England, with its system of good roads, gets \$60,000,000 a year from tourists alone.

If you are a publisher or editor, because improved roads make wider circulation possible, increase advertising by stimulating commercial enterprises, and because road improvement is the most important economic question of the age.

If you are a progressive citizen, because you cannot progress so long as your state and nation remain in the mud.

Concrete Mile Posts

The Chicago, Minneapolis, Omaha & St. Paul Railroad is using concrete mile posts, whistle posts and section posts. They have been in service two years and have given excellent satisfaction. The posts are made wet and the concrete is well puddled. On all surfaces that are to bear letters or figures, a layer of cement mortar $\frac{1}{8}$ " thick is put on with a trowel and carefully worked to insure a smooth surface. After casting the posts are allowed to set for 48 hours before the sides of the molds are removed and for 48 hours more before the bottom plank is removed. In dry weather the posts are sprinkled or covered with damp sacks to prevent too rapid drying. These posts are neat in appearance, hold the paint better than wood, are fire-proof and cost less than wood. Relative costs are as follows:

	Mile Posts.	Section Posts.	Whistle Posts.
Concrete with new reinforcing bars	\$1.08	\$1.08	\$0.91
Concrete with reinforcing bars taken from stock	.76	.76	.67
Wood	2.00	2.00	1.25

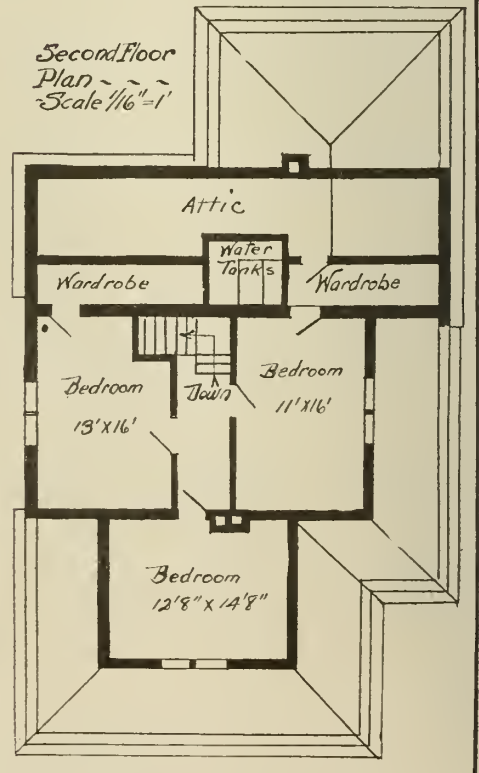
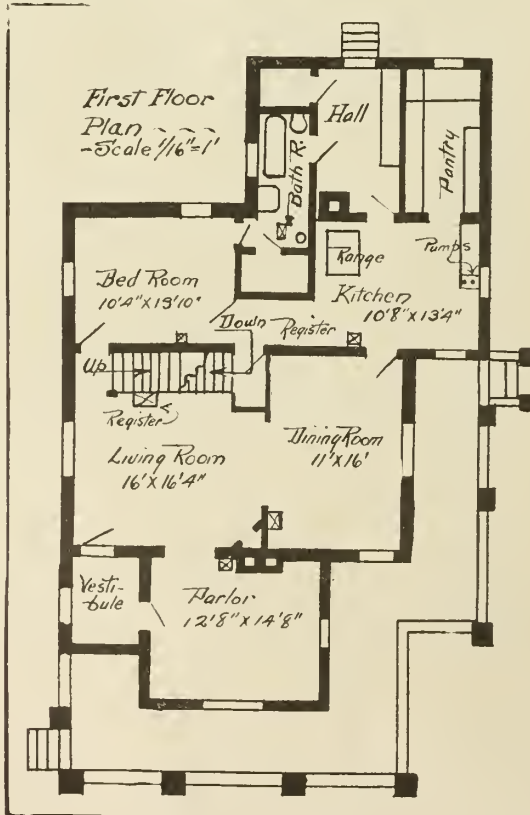
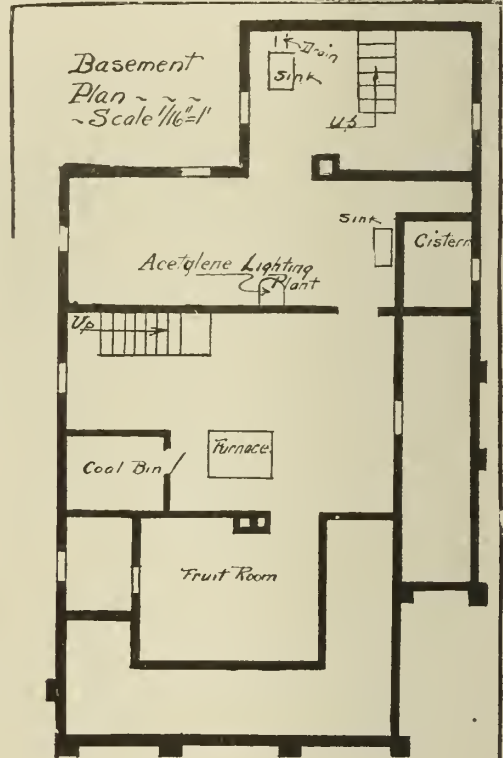
Floor Plans of Concrete Block House Built at Rosewood, Ohio

The house shown in the floor plan and illustration from a photograph was built by Charles F. Nagle for Geo. Dormire, Rosewood, O. The house cost \$3,000. Mr. Dormire explains that this does not include his labor and the small amount



of material that he furnished. Both of these items, however, valued at about \$500, make the actual cost of the house \$3,500. Concrete block were made on the farm where the house was built, using a Foote machine, making the block 8"x8"x16". A mixture of 1:5 cement and bank run gravel was used. The gravel is said to have been of a very good quality. A facing mixture of 1:2 was used and no waterproofing was employed. Mr. Dormire says that the block were made under canvas cover just outside the barn. Block were sprinkled for several days. The builder says he believes a mistake was made in mixing the batches of concrete for the block. Batches were mixed to make about thirty block, mixing being done by hand. While

this mix would be very wet at first, before the last block were made it had dried out considerably. He noticed that when block were laid in the wall some of them appeared to absorb no water when it rained and others soaked it up. The result is that there are two or three spots on the wall of the house where moisture makes a very slight appearance in wet weather, the wall having been plastered direct to the block. Mr. Dormire wants suggestions to correct the fault.





The two photographs reproduced on this page illustrate admirably what attractive work man can be done with white Portland cement. The picture above is of a concrete porch of J. H. Mumford, Halfway, Va., built by C. C. Crossley—courtesy Atlas Portland Cement Co. Below is a concrete bridge at Rochester, N. Y., with a granolithic surface of one part white Portland cement to three parts crushed Barre granite—courtesy Sandusky Portland Cement Co.

Farmers Would Benefit By Better Roads

That the farmers of the United States could save \$2,000,000,000 a year by a system providing more direct dealing with the consumer is the assertion of B. F. Yoakum, chairman of the Frisco Lines, in an interview just made public. Mr. Yoakum is a member of the executive committee of the American Association for Highway Improvement, and has been taking an active part in the work that the association has been doing towards bringing about complete system of improved public highways in the United States. "The total business of the steel industry," said Mr. Yoakum, "measured by the factory value last year was \$550,000,000; the total oil business was \$175,000,000; lumber, \$1,200,000,000; sugar, \$350,000,000, and tobacco, \$175,000,000. These are supposed to be the greatest businesses of the country, and yet the same year the total value of agriculture alone amounted to nine billions of dollars. Two billion dollars saved would mean to the farmers a two billion dollar saving on a nine billion dollar crop. The two billion dollars we could save, by going more direct from the farmer to the consumer, by means of better roads, a parcels post system, etc., nearly equals the factory value of all steel, lumber, oil, sugar, and tobacco sold in the United States last year. The whole country, therefore, should take an interest in the movement for bettering the roads of the United States. There is not a man, woman or child in the country who would not be benefited by an improved system of highways. The country would become richer and more prosperous and everybody would benefit. The cost of living undoubtedly would be reduced."

Construction Plant Layout for a Unit Concrete Building

A recent development in reinforced concrete design put forward primarily to overcome the objection to monolithic concrete construction of its "terrible permanence," is the unit type, consisting of a structural concrete framework with poured slabs. Naturally this new development has brought with it its own problem, not only of design but of mixer plant arrangement, and a notable example of this kind of concrete work at the new plant of the United Shoe Machinery Co. at Beverly, Mass., is interesting from a construction standpoint. E. L. Ransome was retained as consulting engineer on the erection of the new buildings and he was responsible for all the features of the concreting. Columns, girders and beams were molded as units in a section known as the casting area. When thoroughly set these were swung by derricks into place and a light slab poured in place, uniting the entire framework of individual members into a unit structure.

Stone, sand and cement were hauled on an industrial track to a hopper, whence a second track at right angles led to the overhead bins of the mixer plant. This second track was laid up a sharp incline built on trestle work and from this point the material progressed by gravity entirely until it was ready for delivery to the casting yard. The latter was situated along the front of the building between it and the supply track. The cars loaded with concrete from the mixing plant traversed a track which ran close to the building front and parallel with it. The casting



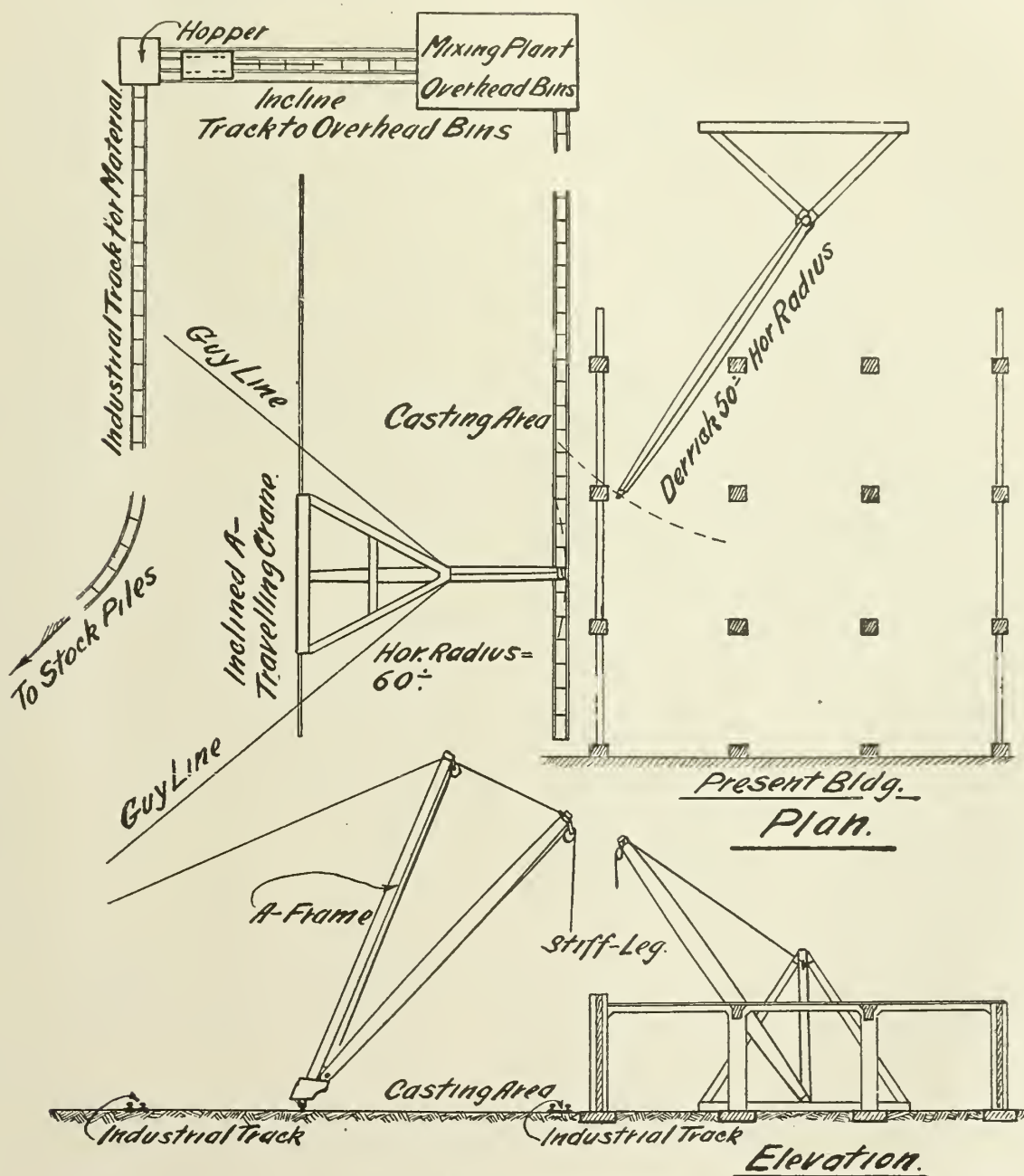
Erecting Unit Concrete Building

forms were arranged alongside this track so that it was exceedingly simple to pour the various members. An ingenious arrangement was used to return the emptied cars to the mixer plant. The track from the mixer to the yard was on an incline. A double drum with a counterweight was rigged up and the cars attached by means of a rope running over the lower drum. The ratio between the upper and lower drums was one to eight and the weight was so regulated that when the car was loaded with full buckets it would go down the incline at a reasonable speed, starting and stopping being regulated by means of a brake on the hoist and pull of the weighted drum. The empty cars were returned up the incline by the usual type of hoisting engine and wound up the weighted drums at the same time. This device worked very well.

For handling the cast sections two trucks were used, one was an inclined A-frame traveling crane running

on a track parallel with the building front with a horizontal radius of 60 feet. This served to pick up the finished girders and beams, which were cast in the gang mold, and delivering them to the section of the building where they were wanted. A beam truck with 60 foot radius located inside the building, then delivered the finished sections to the more remote parts of the building if required. With this plant the work was carried forward at unusually good speed. A floor was set on an average in nine or ten working days, a bay 20' by 60' across the building being run in a day. There was practically no breakage.

The cost worked out to be approximately 10 per cent lower than usual practice in monolithic concrete construction, a significant indication of what may be expected with greater experience in this new type of concrete construction.

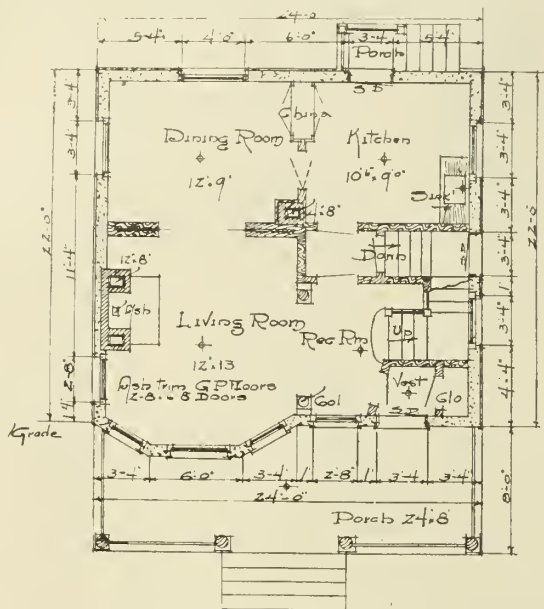


Layout for Unit Construction

Drawings for Cottage of Concrete Block and Rough-Cast Stucco

In this issue of CONCRETE is shown a neat and economical seven-room concrete block and rough-cast plaster cottage.

The foundations to grade are of concrete. A 5" water table runs at the level of the ground. Three courses of block are shown above the grade under the belt course or second water table, and the balance of the lower story is laid up with 8"x16" faced



First Floor Plan—Scale 1/12"=1'

concrete block. The spacing of the windows and the widths and heights of the windows are such as to accommodate themselves to even units without piecing or cutting. The gable ends and dormer walls are plastered on wire lath.

The building has a slate roof, which makes it more nearly fireproof, or of slow-burning construction.

This cottage is 24' wide, suitable to the narrow city lot. The porch extends entirely across the front, and the entrance is through a small vestibule, adjoining which is a coat closet. The vestibule opens to a reception hall which is separated from the living room by interior colonial columns.

The fire-place adds a cheerfulness to the entire first floor. The living room is 12'x13', exclusive of the bay window. The dining room is 12'x9', the kitchen 10' 6"x9'. A china cupboard extends through the partition between the dining room and kitchen. Between these two rooms are double-acting doors. The rear porch is small and is reached by a sash door.

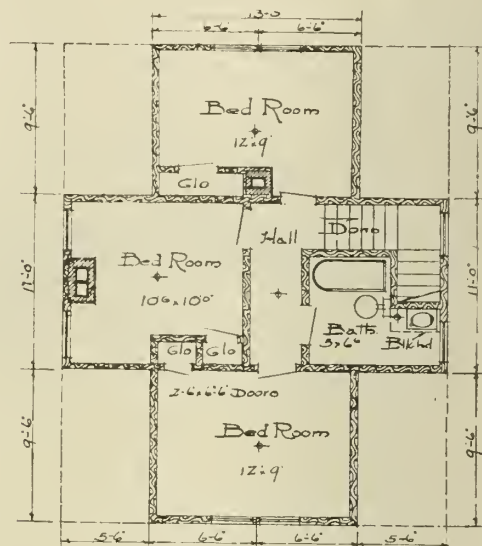
There is an outside or grade entrance to the basement, and also an inside stairway to basement convenient to the kitchen.

On the second floor there are three good bed rooms, each with a closet. The bath room is off the hall.

The arrangement of the second floor is convenient, and the rooms well lighted and ventilated.

Rock wall plaster is used for the whole interior, the walls being plastered directly on the block.

The first story ceiling height is 9' in the clear; second story 7' 6", although this height might be increased to 8' if desired.



Second Floor Plan—Scale 1/12"=1'

Plain and substantial trim is used for the interior, and the construction throughout is substantial yet economical.

The approximate cost of this house is \$1,700 to \$2,000, itemized as follows:

Excavating	\$ 40.00
Concrete footings, foundations and floors	200.00
Concrete block work.....	200.00
Chimneys and fire-place.....	50.00
Rough carpenter work.....	400.00
Interior finish	350.00
Plastering	160.00
Painting and interior finishing...	140.00
Exterior plastering	60.00
Hardware ..	50.00
Wiring	40.00
Incidentals ..	100.00

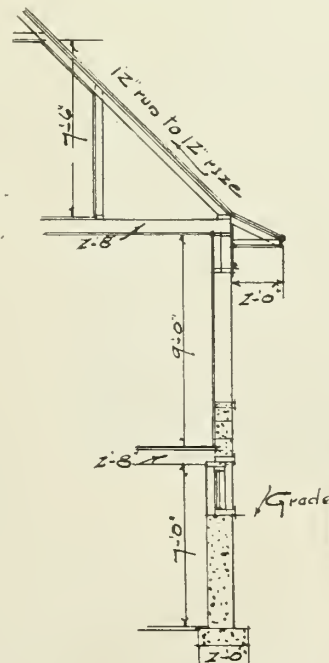
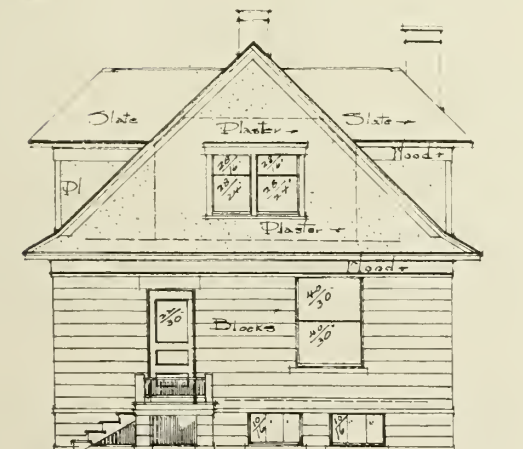
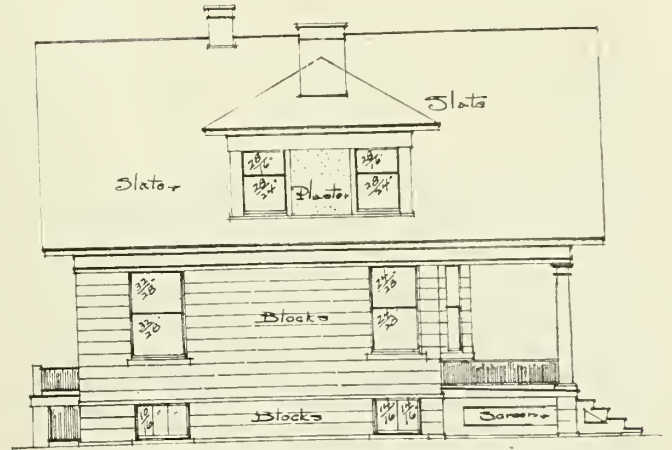
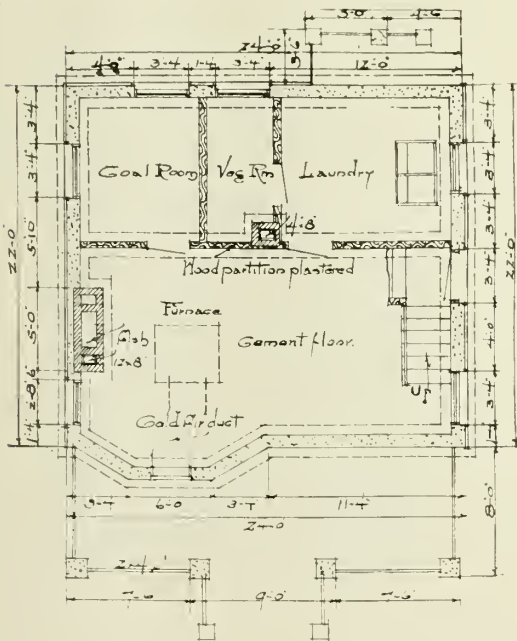
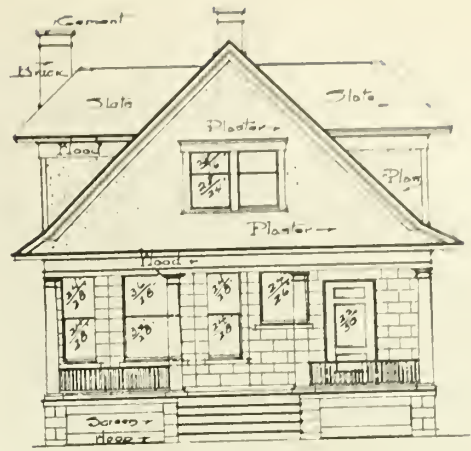
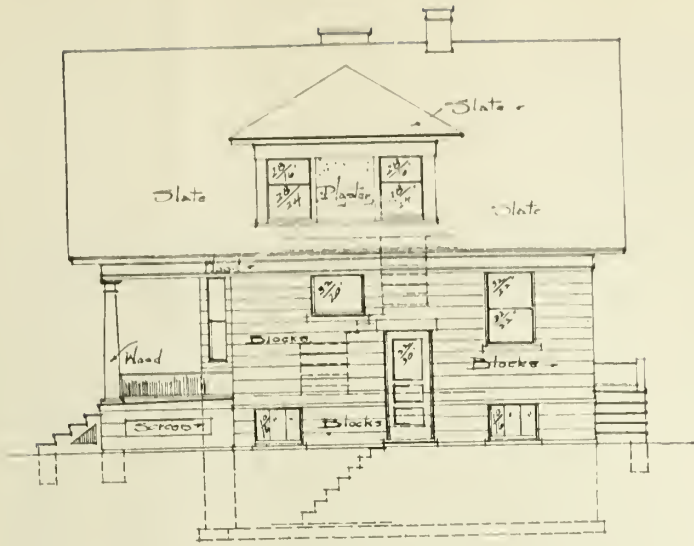
\$1,790.00

Hot air furnace.....	\$165.00
Plumbing ..	220.00

\$385.00 385.00

\$2,175.00

The 1912 Boston Electric Show is being planned on a large scale. It will be held in Mechanics building, Boston, September 28-October 26, this year, and there will be 105,000 square feet of exhibit floor space. This is said to be twice as great as in any previous show.



Side Elevation, Front Elevation, Basement Plan, Side Elevation, Rear Elevation of Concrete Block and Stucco Cottage, Scale 1-12" to 1', and a Wall Section, scale 1-8" to 1'. Description on Opposite Page.

New Sewer Pipe Machine Mixes and Delivers Concrete

A. C. Tunison, M. E., Boise, Idaho, has designed and patented a new concrete sewer pipe machine. He has embodied in its construction the result of many years' study and experience with machinery for making concrete products. The machine takes all the aggregates, mixes them, constructs the pipe, and delivers them ready for the curing room. The range of the machine in size of product is from 4" to 24" pipe or tile.

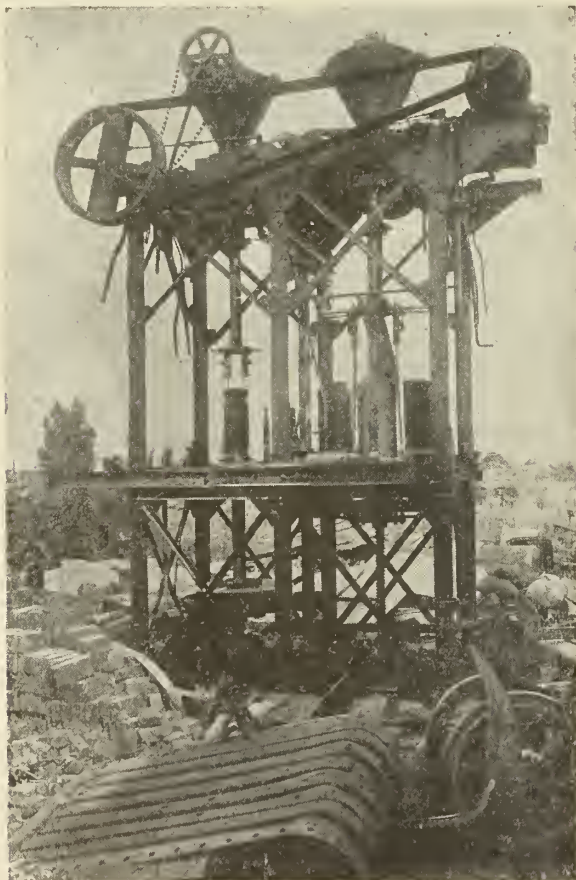
The first process of this, the Atlas machine* is the mixing of the dry aggregates in the dry mixer. The dry mixer is on the floor level with the machine so that the cement and sand can be wheeled to it and dumped without any extra hoist. It is capable of mixing the dry aggregates as fast as required by the machine. It delivers the mixture into a small bin from which it is taken by an elevator of the chain-bucket type and conveyed to the wet mixer above the machine.

This wet mixer is of the batch mixing type and is capable of mixing the dry aggregates with water and

tivity by means of control levers provided for that purpose.

The form in which the pipe is made consists of an inner steel core and an outside steel shell. The inner core is attached to the machine and upon the completion of a pipe it is given a swift revolving motion by the power of the machine. This revolving motion serves thoroughly to trowel and smooth the inner surface so that there are left no cracks or projections to obstruct the flow of matter through the pipe. When the smoothing process is finished the operator lowers the core out of the pipe, and herein lies one of the main advantages of this machine. By lowering the core with a revolving motion it is possible to tamp the material to any desired consistency without disturbing it later with an upward life of the core. The outside steel shell is independent of the machine and is removed with the completed pipe, and the new form placed in position by the carriers as fast as the operation of the machine requires. Pipe are made "bell down." The method provided for tamping the concrete into place around the form is of exactly the same nature as a man tamping the material by hand, but is superior in the fact that it is machine-driven and therefore more regular, more uniform in pressure, and faster in operation. The main shaft to which the four tampers are attached has a perpendicular stroke like the piston rod of a marine engine of the inverted type. The length of this stroke can be varied to suit the size of pipe being made. This shaft has also a second motion which causes it to revolve slowly with each up and down stroke, and by this means the mass within the form is completely and uniformly tamped. The tamper feet are connected to this shaft by means of a steel collar which is screwed upon the shaft. From this collar four arms project horizontally. Attached to these are four reach-rods which reach down into the form, conveying the tamping motion against the concrete. By clamping these to the four horizontal arms at the desired distances from the center it is possible to tamp a pipe of any required diameter up to 24"—the range of the machine. These reach-rods terminate in a small tamper which is connected to them by a flexible joint. By the functioning of this joint it is possible to tamp the bell of the pipe as firmly as the straight sections because such a joint causes a tamper form to accommodate itself to any angle.

The machine weighs about 18,000 pounds, and it can be run at full capacity on 20 horsepower. It is capable of turning out a 24" pipe in three minutes, and the smaller sizes at a greater speed in proportion. The Kansas City Concrete Pipe Co. has installed one of these machines.



Side View of Machine

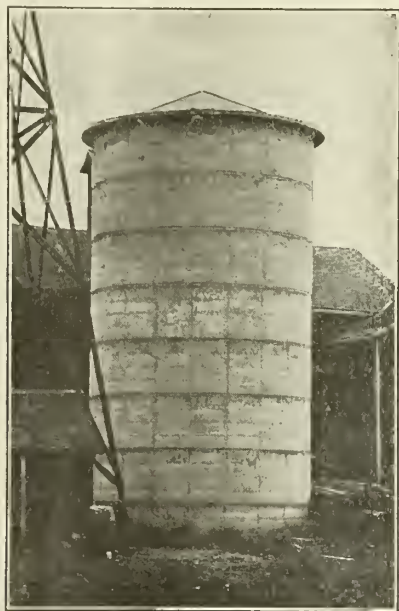
delivering as fast as the machine requires. The two inverted conical figures over the machine are the feed hoppers into which the wet mixer delivers its compound as fast as mixed. From these two hoppers the operator secures the flow of concrete into the form, and he is able to regulate this flow to any desired quan-

The Edison Portland Cement Co. has opened a new limestone quarry at New Village. If the quantity and quality come up to expectations it will mean a saving in cost of manufacture because the limestone now used is taken on cars from Oxford to the mills at New Village.

*Atlas Cement Pipe Machinery Co., Boise, Idaho.

How Permanent Silos May Be Built and Their Values

The principal source of profit in dairying, stock-raising, and farming lies in improving the quality and at the same time keeping down the cost of production. In this matter of profit and loss nothing plays such an important part as the question of feeds and feeding. The natural feed for animals, the one on which they do best, is green pasture. In climates subject to frost, man has made the same provision for animals as for himself by providing them in winter with canned green fodder called "silage." Silage is made most commonly from corn, cow peas, clover, sorghum, or alfalfa, merely chopped fine and stored in large watertight cans known as "silos." In dry weather or in winter,



Silo Complete

when green pasture cannot be had, this feed is equally good in producing a flow of milk or in putting fat on animals. One acre of a crop harvested as silage will feed twice as much stock as the same amount harvested in any other manner.

Like a glass fruit jar, a silo must be watertight and jointless to keep the silage from moulding or "dry firing." For this reason, and also because no painting or repairing is ever necessary, solid-wall concrete silos are coming into general use.

The best silos are built circular in shape. The size depends upon how many animals are to be fed daily, the quantity in pounds for each animal's daily feed, and the number of days it may be necessary to feed them. The silo should be of such size that a layer of silage at least 2" in depth will be removed each day after feeding has begun. This prevents a thin top layer from moulding. A dairy cow requires about 40 pounds of silage per day, and the following table is based on this amount. Forty

pounds is also the average weight of a cubic foot of silage:

DIMENSIONS OF SILO ACCORDING TO SIZE OF HERD.

NO. OF COWS. IN HERD.	FEED FOR 180 DAYS.				FEED FOR 240 DAYS.			
	Estimated Ton- nage of Silage Consumed.	Size of Silo.		Corn Acreage Required at 15 Tons to Acre.	Estimated Ton- nage of Silage Consumed.	Size of Silo.		Corn Acreage Required at 15 Tons to Acre.
		Diameter	Height			Diameter	Height	
	Tons.	Feet.	Feet.	Acres.	Tons.	Feet.	Feet.	Acres.
10.....	36	10	25	2½	48	10	31	3½
12.....	43	10	28	3	57	10	35	4
15.....	54	11	29	4	72	11	36	5
20.....	72	12	32	5	96	12	39	6½
25.....	90	13	33	106	120	13	40	8
30.....	108	14	34	7½	144	15	37	10
35.....	126	15	34	8½	168	16	38	11
40.....	144	16	35	10	192	17	39	13
45.....	162	16	37	11	216	18	39	14½
50.....	180	17	37	12	240	19	39	16
60.....	216	18	39	14½	288	20	40	19
70.....	252	19	40	17	336	..	..	..

It is frequently advisable to cut down the average daily ration or to use silage together with other feeds. With this thought in mind, and especially for dry weather feeding in summer, many farmers find it best to build two silos of moderate size instead of one large structure.

Locate the silo where it will be convenient for feeding. Usually it is joined to the barn by means of a chute and passageway with doors. Since the silo and its contents are heavy, it must be built on solid ground. The bottom of the foundation should go below frost line. The silo may, with advantage, extend 4' to 5' into the ground. Dig the pit large enough to allow for the thickness of the circular walls and a footing 2' wide.

MAKING THE FORMS.

In order to save lumber the concrete is poured into forms which can be moved up as the concrete sets or becomes hard. These movable forms consist of two circular shells 3' to 4' high, so made that one fits within the other with space between for a 6" wall. The horizontal framework consists of 2"x4" timbers cut to a circle, which are covered with sheet metal or wooden lagging. Each piece must be long enough to provide for a 6' 3" length of the circumference of the circle as well as several inches for lap or strap joints. The forms are raised by loosening them at the joints and setting them up again on the finished section of the silo.†

Concrete for silos should be rich in Portland cement and should be put into the forms mushy wet. Mix it 1 part cement to 2 parts sand to 4 parts crushed rock. Four parts of clean pit or bank-run gravel may be used instead of the sand and rock. Measure all materials on the basis that 1 bag of cement equals 1 cubic foot. Many persons raise

†As to silo forms, the attention of the reader is called to the fact that there are several excellent systems on the market which make it unnecessary to use home-made makeshifts in the way of form construction. Neither is the monolithic concrete wall the only use of concrete which has given good service in the construction of silos. CONCRETE frequently has called attention to block silos—built after various systems.

*Courtesy The Association of American Portland Cement Manufacturers.

the concrete in buckets, but the work can be done more quickly and easily by using a horse together with a derrick or a well braced jib-boom fixed to an adjoining building.

BUILDING THE SILO.

The finished silo shown in the illustration is 15' in diameter (inside) and 36' high, of which 4' is below ground. At odd times all of the materials were hauled, so that there would be no delay when the work was started. After the pit was dug to solid clay, the concrete footings (2' wide and 1' thick) were placed and a 4" concrete floor was laid upon the natural clay bottom. The next day the forms were set up, the reinforcement placed, and the walls begun. These forms were 4' feet high and were made in eight sections 6' 3" long.

Since silage contains so much water, steel rods are necessary as reinforcement to withstand the pressure. To get the best results, this reinforcing should be placed exactly 1½" from the outside of the silo wall. Rods ¾" in diameter and 10' long were used. The vertical rods were spaced 18" apart. Measuring down from the top of the silo, the horizontal rods were spaced as shown in the tables below.

SPACING OF HORIZONTAL REINFORCEMENT.

Feet distant from top.....	40-35	35-30	30-25	25-20	20-15	15-10	10-0
Spacing in inches	6	7	8	10	12	15	18

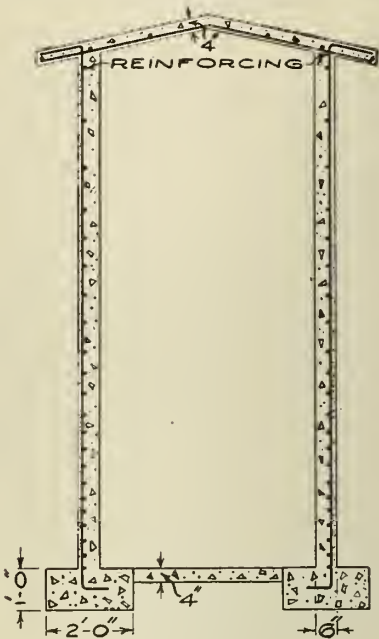
The horizontal rods were carefully made into solid hoops by bending the ends so as to hook together. They were also wired to the inside of the vertical rods. Two extra lengths were placed in the concrete 1½" above the door openings for removing the silage. These openings were made by a removable form (also cut to the circle), which fitted snugly between the molds for the silo wall.

The silo forms were filled with concrete and allowed to stand over night. The next morning they were loosened, raised and again filled. These operations were repeated daily until the side walls were finished.

With a 4" concrete roof, the silo is entirely fire-and repair-proof. The roof was built on a temporary wooden roof, which was entirely removed after three weeks. The concrete roof is cone-shaped with a rise in the center of 2' and a drip or overhang of 1'. One inch from the under side, this roof is reinforced with ¾" rods laid like the spokes of a wheel and spaced 18" from the rim. Every other rod reached only half-way to the peak of the roof. To hold the spokes in position so that the concrete could be forced between them and the temporary wooden roof, one ring of ¾" rods was wired to this reinforcing just over the side walls and another half-way to the peak. These rods strengthen the roof greatly and must not be left out. Water-soaked weather boards were used to form the circular edge of the roof. An opening for the blower tube from

the cutter was formed in the silo roof in the same manner as the doors in the side walls.

The list of materials required for this silo is given below together with a very liberal estimate of the cost. The silo was built by five farm laborers in



Section of Silo

thirteen days. As a raise was made each day, the four extra days were spent in framing the forms, digging the pit and building the roof. The owner used gravel from his own farm pit instead of stone and sand:

BILL OF MATERIALS.

Crushed rock, or screened gravel.....	40 cu. yds. at \$1.10.....	\$ 44.00
Sand.....	20 cu. yds. at \$1.00.....	20.00
Portland cement.....	54 barrels at \$2.50.....	135.00
Reinforcing, 425 pieces of ¾" x 10' rods.....	1564 pounds at \$0.02¼.....	39.10
		\$238.10

The first cost of concrete silos may or may not be greater than that of the best of any other kind. The time is now at hand when farmers, like railroads and other corporations, are considering the lasting qualities of buildings. Concrete silos need no insurance; they do not blow down or burn up. They never have to be painted or repaired. With other kinds of silos, during their short lives, these expenses alone equal the first cost. Concrete lasts forever.



Government uses concrete in building barracks at Fort Crockett, Galveston, Texas.

Unit Cost Figures In Reinforced Concrete Construction*

BY CHESTER S. ALLEN†

Unit costs are in a way like strong drink, harmless where used with judgment and prudence, but likely to bring remorse and anguish where employed promiscuously. Rare and talented indeed is the man who possesses the experience, judgment, and intuitive sense to know when, where, and how properly to modify any tables or statements of unit costs to meet the peculiar conditions of each individual case. While the figures given in this paper are all taken from structures erected in the last two years under the writer's supervision, variation as to range of territory, local conditions, and seasons of the year has been so great in the pieces of work executed as to render the information given of value only in a very general way.

As a general proposition we have found that reinforced concrete is the lowest priced fireproof material suitable for factory construction and while it is true that its first cost will generally run from 5 per cent to 20 per cent higher than first-class mill construction we have recently had several instances where, with lumber at a high price, reinforced concrete has worked out cheaper than brick and timber. It is especially adapted to heavy construction and for heavy loads of 200 pounds per square foot and over, where the spans are eighteen to twenty feet centers, not even timber can compete with it.

The unit costs of projected or completed buildings are commonly figured at so much per cubic foot or at so much per square foot of area occupied. Table I gives the unit costs both on the square foot basis and the cubic foot basis, together with a general description, of a number of reinforced concrete industrial buildings of different types erected in the last two years. It will be seen from an examination of this table that the average cost per square foot of these buildings, excluding the one-story structures, was \$1.12, while the average cost per cubic foot was 8.7 cents. The one-story structures both had reinforced concrete sawtooth roofs and the average cost per square foot was \$1.77, while 8.5 cents was the average cost per cubic foot. The above costs are for the finished buildings, including plumbing, but do not embody heating, lighting, elevators, sprinklers, and power equipment. The cost per square foot of floor area was obtained by dividing the cost of the building by the total number of square feet of floor area, exclusive of roof area but including basement floors, and the cost per cubic foot by dividing the cubical contents into the cost of the structure.

While no coal pockets are included in Table I, it has been our experience that above 3,000 tons capacity reinforced concrete elevator coal pockets cost from \$5.50 to \$7.50 per ton of capacity. Stand-

pipes, exclusive of the foundations, average from 2½ to 3 cents per gallon of capacity.

On much of the reinforced concrete work which has been done under our supervision it has been possible owing to the contract being either on a percentage basis or a cost-plus-a-fixed-sum basis for us to obtain quite accurate and comprehensive cost data. These data, of course, are only of particular value where all the local color of each specific case is known, but the average results are at least interesting.

The average unit cost of the 1:2:4 concrete in floors, including beams, girders, and slabs, was \$6.10 per cubic yard, and for the columns \$6.70 per cubic yard. Where a 1:1½:3 mixture was used for the columns the average cost was \$7.60 per cubic yard. This cost was made up of the items of cement, sand, stone or gravel, labor, and plant. The cement cost varied greatly with the demand, but the average net cost was \$1.35 per barrel, including three cents for tests. The sand averaged 80 cents per cubic yard, and the crushed stone \$1.25 per cubic yard. The cost of labor of unloading the materials and mixing and placing the concrete varied from 65 cents to \$2.90 per cubic yard. The cost of plant, consisting of freight, depreciation or rental of mixing and hoisting towers, erection of towers, power, and coal, and losses and waste on the small tools, ranged from 50 cents to \$1.50 per cubic yard of concrete placed.

Next to the proper design of the structural features of a concrete building the economical design of the form work is of paramount importance. The truth of this statement is borne out by the fact that on the average job the cost of the forms amounts to about one-third the cost of the entire structure. On the buildings under consideration the average cost of the forms for the floors, including beams, girders, and slabs, was 10 cents per square foot, and for the columns 13 cents per square foot. The lowest cost was in a building of the so-called "mushroom" or flat slab type of construction where by the intelligent use of corrugated iron for the slab forms the cost of the floor forms, including wall beams, was 7 cents per square foot, and the highest cost was for an artistic, but not elaborate, overhanging cornice on a 12-story building which was 32 cents per square foot. This last item rather forcibly demonstrates that any attempt at architectural development is very apt to be a costly matter.

The cost of the labor in making, erecting, and stripping the forms varied according to the price of lumber, design of the structure, method of forming, character of the supervision and the skill of the workmen from 4¾ to 12 cents per square foot. The cost of lumber, nails and oil divided by the square feet of forms averaged from 2¼ to 4½ cents per square foot.

The cost of bending and placing the reinforcing steel, including the necessary wire, averaged \$10

*Presented at the eighth annual Convention of the National Association of Cement Users, March 11-16, 1912, Kansas City, Mo.

†Lockwood Greene & Co., Boston, Mass.

per ton, the range being from \$5.75 per ton to \$17.20 per ton.

Granolithic floor finish $1\frac{1}{4}$ " thick when laid before the concrete below it had set, so as to form one homogeneous slab, cost on the average of $4\frac{1}{2}$ cents per square foot. When put on after the rough concrete slab had set the cost averaged 7 cents per square foot.

Inasmuch as the only economical design of a reinforced concrete structure is one which closely resembles that of the steel skeleton type, the relative cost of the various materials commonly used for curtain walls under the windows may be of interest. The writer has used brick, vitrified tile, concrete block, cast concrete slabs and solid concrete walls for this purpose.

The most common type of curtain wall has been either an 8" or 12" brick wall resting on the concrete wall beam. The average cost of these walls has been 45 cents per square foot. There is practically no difference in cost between the 8" and the 12" brick curtain wall as the saving in material is offset by the great amount of extra labor in culling and laying the thinner wall.

An excellent and inexpensive spandrel wall is constructed by using 8"x12"x18" vitrified tile. This is a non-absorbent wall and when properly laid in cement mortar makes a tight weather proof curtain wall. The cost of this wall averages about 25 cents per square foot. If the tile is plastered both sides the cost is about 38 cents per square foot.

Where 8" concrete curtain walls were cast in place after the skeleton frame was completed the average cost was 40 cents per square foot, and when poured simultaneously with the columns 48 cents per square foot. Four inch cast concrete slabs cost about 35 cents per square foot.

While concrete block make a very cheap and light curtain wall, the price being about the same as for the 8" tile, the writer's experience with them has been rather unfortunate on account of their extreme porosity.*

Where the location of the buildings has demanded special treatment of the exposed surfaces we have generally specified rubbing with carborundum block. The average cost of this work has been 4 cents per square foot. In two instances portions

of the structure have been bush-hammered with a resulting average cost of 7 cents per square foot.

Concrete piles were used in the foundations of several of the buildings and the average cost of the piles was \$1.15 per linear foot.

The most common methods of waterproofing concrete structures are by the introduction of foreign ingredients into the concrete, by the application of a compound to the concrete surface, by the use of paper or felt waterproofing and by accurately grading and proportioning the aggregate and the cement.

Hydrated lime, in the amount of 10 per cent of the weight of the cement, has been used and the added cost of a cubic yard of 1:2:4 concrete has been 50 cents. Patented compounds similar to Hydrolithic cement have cost from 25 to 35 cents per square foot of surface covered. On horizontal or inclined surfaces we have sometimes used a granolithic surface of rich mortar of Portland cement and sand, or Portland cement and screenings in the proportions of 1:1 laid at the same time as the base and troweled as in side wall construction. The cost of this work has been about 5 cents per square foot.

Taken as a whole, the lowest possible cost on a reinforced concrete building can be obtained only by a careful study of each particular case to determine the cheapest type of construction and most economical spacing of columns. As a general proposition we have found that for light loads with ordinary beam and girder construction the most economical spacing of columns has been 18' each way and for flat slab construction 20' each way. For heavy loads, such as 300 pounds per square foot and over, it has been our experience that the cheapest column spacing for beam and girder construction is 15' by 15' and for flat slab construction 17' by 17'. In arriving at the most economical layout it is always well to bear in mind that the construction which allows the greatest simplicity of form units together with the maximum number of repetitions of same units is invariably the one that will work out cheapest in the end. The fact that the actual amount of concrete or steel required for a curtain floor construction is less than that required in another by no means implies that this is actually the cheapest floor construction, as the unit labor of the form work may easily have been increased out of all proportion.

*It appears from Mr. Allen's statement that the East is not making concrete block of the quality to be found in the West—or perhaps he has been unusually unfortunate in the selection of block.—Editor.

TABLE I.

Type of Building	Dimensions	No. Stories	Story Ht.	Live Load lbs. per Sq. Ft.	Type of Construction	Col. Spacing	Total Cost	
							Per Sq. Ft.	Per Cu. Ft.
Machine Shop	120' x 50'	4	12' 0"	150	Beam	10' 0" x 24' 0"	\$1.17	\$0.09
Cotton Mill	550' x 129'	2	16' 0"	75	Beam	10' 8" x 25' 0"	0.98	0.07
		4	12' 6"	150	Flat Slab	17' 0" x 20' 0"	1.09	0.077
Weaving Mill	140' x 60'	5	12' 6"	150	Flat Slab	17' 6" x 20' 0"	1.50	0.12
Knitting Mill	220' x 75'	2	14' 0"	125	Beam and Girder	22' 0" x 25' 0"	1.09	0.073
Factory	223' x 56'	2	16' 0"	300 & 1000	Beam and Girder	18' 6" x 18' 6"	1.55	0.10
Weave Shed	341' x 231'	1		125	Sawtooth Skylight	13' 0" x 21' 4"	1.79	0.07
Machine Shop	220' x 100'	1			Sawtooth Skylight	20' 0" x 20' 0"	1.75	0.10
Store House	181' x 56'	4	14' 6"	150	Flat Slab	18' 0" x 20' 0"	1.15	0.07
Store House	580' x 109'	10	12' 0"	250	Beam and Girder	19' 3" x 25' 0" and 19' 0"	0.85	0.071
Store House							0.76	0.05
Store House	256' x 100'	12	8' 0"	150	Flat Slab	16' 0" x 16' 8"	1.04	0.12

Reinforced Concrete Reservoir Gateway

The accompanying illustration is of a reinforced concrete gateway for a reservoir of the Bristol & Warren Water Works Co. operating in the Rhode Island towns of the same names. This company secures its supply from a reservoir formed by a natural valley which has at one end an earth rubble dam with a timber apron at the spillway. Surmounting this spillway is the reinforced concrete gateway, built by the



Reservoir Gateway

Aberthaw Construction Co., Boston, Mass., under the direction of Samuel Gray, Providence, R. I., the designer of the structure.

At especially high tide in the bay the salt water level for a short time is apt to be slightly above the level of the water in the reservoir. This made it imperative to have some arrangement which would pass out any surplus water during heavy rainfalls but would tightly close against the ingress of salt water from the bay. It is stated that this gateway has very satisfactorily fulfilled its purpose. It consists of cast iron plates carefully machined, which are spaced and rest upon substantial composition seats embedded in the concrete. These are hinged at the top in such a way that they are normally in the closed position unless the force of the water upstream opens them.

The second annual New York Architecture and Engineering Exhibition, which was to have been held from March 25 to 30, has been merged with, and will be held in conjunction with the Fire Exposition, October 2 to 12, constituting a department of fireproof construction and safety building equipment.

Proposed Recommended Practice For Plain Concrete Drain Tile*

This recommended practice is intended to cover the general requirements for the manufacture of plain concrete drain tile.

Cement.—The cement shall meet the requirements of the Standard Specifications for Portland Cement of the American Society for Testing Materials, and adopted by this Association (Standard No. 1).

Aggregates.—The aggregates shall be clean, hard, durable material, and shall have no coating of clay or other substances which would in any way interfere with the bond between the cement and the aggregate.

(a) *Fine Aggregate.*—The fine aggregate shall consist of sand or crushed stone graded from fine to coarse, all of it passing when dry, a screen having $\frac{1}{4}$ " diameter holes; not more than 20 per cent. shall pass a sieve having 50 meshes per linear inch, and not more than 6 per cent. of it passing a sieve having 100 meshes per linear inch.

(b) *Coarse Aggregate.*—The coarse aggregate shall consist of gravel, crushed stone or other suitable material graded in size, which is retained on a screen having $\frac{1}{4}$ " diameter holes.

Water.—Water shall be clean, free from oil, acid, strong alkalies or vegetable matter.

PROPORTIONS.

The proportions of cement to aggregate shall be such as require at least the minimum amount of cement to produce strength and density as hereinafter specified. The proportions of the various sizes of aggregates and cement to aggregates shall preferably be made by weight. If by volume, a bag of Portland cement shall be considered 1 cubic foot.

Measuring.—Methods of measurement of the proportions of the various ingredients shall be used which will secure uniform measurements at all times.

MIXING.

The ingredients of concrete shall be thoroughly mixed dry, sufficient water added to obtain the desired consistency, and the mixing shall continue until the cement is uniformly distributed and the mass is uniform in color and homogeneous.

Machine Mixing.—The mixing shall preferably be done with a machine mixer of a type which insures the proper mixing of the materials throughout the mass.

Consistency. (a) *Semi-wet Process.*—The consistency of the concrete shall be such as to show web-like markings on the surface of the tile when the forms are removed.

(b) *Wet Process.*—The consistency of the concrete shall be such that it will be forced into every part of the mold by jarring or tapping.

Retempering.—Retempering or using mortar or concrete 40 minutes after being mixed shall not be permitted.

CURING.

Natural Curing.—The tile shall be protected from

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo., March, 1912; to be voted upon by the members in letter ballot.

the sun and strong currents of air for a period of at least 7 days. During this period they shall be sprinkled at such intervals as is necessary to prevent drying, and maintained at a temperature of not less than 50° F. Such other precautions shall be taken as to enable the hardening to take place under the most favorable conditions. After 7 days, the tile may be removed to the yard but in no case used before they are 28 days old.

Steam Curing.—The tile shall be removed from the molds as soon as conditions will permit and shall be placed in an atmosphere of steam saturated with moisture for a period of at least 48 hours. The tile shall then be removed and stored for at least 8 days. The steam-curing chamber shall contain an atmosphere saturated with moisture and maintained at a temperature between 100° and 130° F. (This does not apply to pressure steam curing.)

DIMENSIONS.

(a) *Diameter.*—The diameter or size of the tile shall refer to the inside diameter and be uniform in all directions.

(b) *Thickness.*—From 4" to and including 22" in diameter, the wall thickness shall not be less than one-twelfth of the diameter. Tile above 22" in diameter shall have a wall thickness of not less than one-tenth of the diameter.

(c) *Length.*—The length of the tile shall be uniform at all points, and preferably not less than the diameter, with a minimum of 12".

Standard Specifications for Concrete Road and Street Pavement*

1. *Cement.*—The cement shall meet the requirements of the Standard Specifications for Portland Cement of the American Society for Testing Materials, and adopted by this Association (Standard No. 1).

2. *Fine Aggregates.*—Fine aggregates shall consist of sand, crushed stone or gravel screenings, graded from fine to coarse, passing when dry a screen having $\frac{1}{4}$ " diameter holes, shall be preferably of siliceous materials, clean, coarse, free from loam, vegetable or other deleterious matter, and not more than three per cent. shall pass a sieve having 100 meshes per linear inch.

Mortars composed of one part Portland cement and three parts fine aggregate by weight when made into briquets, shall show a tensile strength of at least 70 per cent. of the strength of 1:3 mortar of the same consistency made with the same cement and standard Ottawa sand.

3. *Coarse Aggregates.*—Coarse aggregates shall consist of inert material, graded in size, such as crushed stone or gravel, which is retained on a screen having $\frac{1}{4}$ " diameter holes, shall be clean, hard, durable, and free from all deleterious matter. Aggregates containing soft, flat or elongated particles shall be excluded.

The maximum size of the coarse aggregate shall be such that it will not separate from the mortar in laying

and the size of the coarse aggregate shall be such as to pass a $1\frac{1}{2}$ " ring.

4. *Natural Mixed Aggregates.*—Natural deposits of sand and gravel usually being out of balance, shall be screened and remixed to agree with the proportions specified under base.

5. *Sub-base.*—Only clean, hard, suitable material shall be used, not exceeding 4" in the largest dimension.

6. *Water.*—Water shall be clean, free from oil, acid, strong alkalis or vegetable matter.

7. *Expansion Joint Filler.*—The expansion joint filler shall be a suitable elastic, waterproof compound that will not become soft and run out in hot weather or hard and brittle and chip out in cold weather.

SUB-GRADE.

8. *Section.*—The sub-grade shall have a rise at the center of not more than one one-hundredth of the width of the pavement.

9. *Depth.*—(a)* The sub-grade shall not be less than $13\frac{1}{2}$ " below the finished surface of the pavement.

(b) The sub-grade shall not be less than $7\frac{1}{2}$ " below the finished surface of the pavement.

10. *Depth of Layers.*—All soft or spongy places shall be removed, and all depressions filled with a suitable material, which shall be thoroughly compacted in layers not exceeding 6" in thickness.

11. *Deep Fills.*—When a fill exceeding one foot in thickness is required to bring the pavement to grade, it shall be made in a manner satisfactory to the engineer.

12. *Drainage.*—When required, a suitable drainage system shall be installed and connected with sewers or other drains indicated by the engineer.

SUB-BASE.*

13. *Thickness.*—On the sub-grade shall be spread a suitable material hereinbefore specified which shall be rolled or rammed thoroughly to a surface at least $7\frac{1}{2}$ " below the finished surface of the pavement.

14. *Wet Materials.*—While compacting the sub-base the material shall be kept thoroughly wet and shall be in that condition when the concrete is deposited.

FORMS.

15. *Material.*—Forms shall be free from warp, and of sufficient strength to resist springing out of shape. All mortar and dirt shall be removed from forms that have been previously used.

16. *Setting.*—The forms shall be well staked to the established lines and grades.

17. *Wetting.*—All forms shall be wetted thoroughly before any material is deposited against them.

EXPANSION JOINTS.

18. *Width and Location.*—Expansion joints $\frac{1}{2}$ " wide shall be placed at least every 50' and between the curb or edge of the gutter and the pavement.

BASE.

19. *Proportions.*—The concrete for the base shall be so proportioned that the cement shall overfill the

*When a sub-base is required eliminate paragraph 9 b. When a sub-base is not required eliminate paragraphs 5, 13, 14 and 9 a.

Unless 9 a is eliminated 9 b is void.

*Adopted by the National Association of Cement Users.

voids in the fine aggregate by at least five per cent., and the mortar shall overfill the voids in the coarse aggregate by at least ten per cent. The proportions shall not exceed one part cement to eight parts fine and coarse aggregates.

When the voids are not determined the concrete shall have the proportions of one part cement, three parts fine aggregate and five parts coarse aggregate.

20. *Measuring.*—The method of measuring the materials for the concrete, including water, shall be one which will insure separate uniform proportions at all times. A bag of cement (94 pounds) shall be considered to have a volume of one cubic foot.

21. *Mixing.*—The ingredients of the concrete shall be thoroughly mixed dry, sufficient water added to obtain the desired consistency, and the mixing continued until the materials are uniformly distributed and the mass is uniform in color and homogeneous.

22. *Machine Mixing.*—When the conditions will permit, a machine mixer of a type which insures the uniform proportioning of the materials throughout the mass shall be used.

23. *Hand Mixing.*—When it is necessary to mix by hand, the mixing shall be on a water-tight platform and the materials shall be turned until they are homogeneous in appearance and color.

24. *Consistency.*—The materials shall be mixed wet enough to produce a concrete of a consistency that will flush readily under light tamping, but which can be handled without causing a separation of the coarse aggregate from the mortar and which will not creep towards the curb or sag out of place when deposited and lightly tamped.

25. *Retempering.*—Retempering, that is, remixing with additional water, mortar or concrete that has partially hardened, with not be permitted.

26. *Placing.*—The concrete shall be deposited in strips extending across the full width of the area paved. After the addition of water the mixture shall be handled rapidly to the place of final deposit. Under no circumstances shall concrete be used that has partly hardened.

Concrete shall not be mixed or deposited when the temperature is below freezing unless special precautions are taken to avoid the use of materials containing frost, and to protect the work against frost until thoroughly hardened.

Workmen shall not be permitted to walk on freshly laid concrete, and where sand and dust collect on the base it shall be removed carefully before the wearing surface is applied.

WEARING SURFACE.

27. *Mixing.*—The wearing surface shall be mixed of one part cement and not more than one and one-half parts fine aggregate, with sufficient water to produce a consistency which will not require tamping but which can be easily spread into position with a straight edge.

28. *Depositing.*—The wearing surface shall be spread on the base immediately after mixing, and in no case shall more than 50 minutes elapse between the

time that the concrete for the base is mixed and the time the wearing course is floated.

29. *Thickness.*—The wearing surface of the pavement in a residence district shall be at least 1½" thick, and in a business district at least 2" thick.

30. *Finishing.*—The wearing surface shall be finished with a wood float, and before it has completely hardened it shall be roughened by brushing with a stiff vegetable fiber brush or broom.

31. *Edges.*—The edges of all expansion joints shall be rounded to a radius of about ½".

32. *Color.*—Where coloring matter is required it shall be mixed dry with the sand and cement, which have been previously mixed dry, until the mixture is of a uniform color. The quantity and quality of the coloring shall be such as not to impair the strength of the wearing surface.

PROTECTION.

When complete, the pavement shall be kept well sprinkled with water for a period of at least three days and shall not be thrown open to traffic until the engineer so directs.

Proposed Standard Specifications for Plain Concrete Floors*

1. *Cement.*—The cement shall meet the requirements of the Standard Specifications for Portland cement of the American Society for Testing Materials, and adopted by this Association (Standard No. 1).

2. *Fine Aggregate for Concrete.*—Fine aggregate shall consist of sand, crushed stone, or gravel screenings, graded from fine to coarse and passing when dry a screen having ¼" diameter holes; it preferably should be of silicious material, clean, coarse, free from dust, soft particles, vegetable loam or other deleterious matter, and not more than three per cent. shall pass a sieve having 100 meshes per linear inch.

Fine aggregates shall be of such quality that mortar composed of one part Portland cement and three parts fine aggregate by weight when made into briquettes will show a tensile strength at least equal to the strength 1:3 mortar of the same consistency made with the same cement and standard Ottawa sand.

In no case shall fine aggregate containing frost or lumps of frozen material be used.

3. *Coarse Aggregate.*—Coarse aggregate shall consist of inert materials, such as crushed stone or gravel, graded in size, which are retained upon a screen having ¼" diameter holes, shall be clean, hard, durable and free from all deleterious matter. Aggregates containing dust, soft, flat, or elongated particles shall be rejected.

The maximum size of the coarse aggregate shall be such that it will not separate from the mortar in laying, and will not prevent the concrete from fully surrounding the reinforcement or filling all parts of the

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo., March, 1912; to be voted upon by members in letter ballot.

forms. The maximum size of the coarse aggregate shall be such as to pass a 1" ring.

4. *Aggregate for Wearing Surface.*—The aggregate shall consist of sand or screenings from granite or other close-grained durable rock sufficiently hard to scratch glass, free from loam or other deleterious matter, mixed in the proportion of three parts passing a $\frac{1}{2}$ " ring and retained on a $\frac{1}{4}$ " ring, and two parts passing a $\frac{1}{4}$ " ring and retained upon a screen having 50 meshes per linear inch.

5. *Natural Mixed Aggregates.*—Natural deposits of sand and gravel shall be screened and remixed to agree with the proportions specified.

6. *Sub-Base.*—Only clean, hard, suitable materials shall be used, not exceeding 4" in the largest dimension.

7. *Water.*—Water shall be clean, free from oil, acid, alkalis or vegetable matter.

8. *Coloring.*—If artificial coloring matter is required only mineral colors shall be used.

9. *Expansion Joint Filler.*—Expansion joint filler shall be a suitable elastic, waterproof compound that will not become soft and run out in hot weather or harden, become brittle and chip out in cold weather.

SUB-GRADE.*

10. *Depth.*—(a) The sub-grade shall not be less than 11" below the finished surface of the floor.

(b) The sub-grade shall not be less than 5" below the finished surface of the floor.

11. *Preparation of Sub-Grade.*—All soft, or spongy places shall be dug out and all depressions filled with a suitable filling material which shall be thoroughly compacted by flooding and tamping in layers not exceeding 6" in thickness.

12. *Deep Fills.*—When a fill exceeding 1' in thickness is required to bring the floor to grade it shall be made in a manner satisfactory to the engineer.

13. *Drainage.*—When required a suitable drainage system shall be installed and connected with the sewers or other drains indicated by the engineer.

SUB-BASE.†

14. *Thickness.*—On wet, spongy foundations, or where considered necessary by the engineer, a suitable material hereinbefore specified shall be thoroughly rammed to a surface at least 5" below the final grade of the floor.

15. *Wetting.*—While compacting the sub-base, the material shall be kept thoroughly wet and shall be in that condition when the concrete is deposited.

FORMS.

16. *Material.*—Forms shall be free from warp and of sufficient strength to resist springing out of shape. All mortar and dirt shall be removed from forms that have been previously used.

17. *Setting.*—The forms shall be well staked or otherwise held to the established lines and grades, and

*When a sub-base is required eliminate paragraph 10 (b).

†When a sub-base is not required eliminate paragraphs 6, 10 (a), 14 and 15. Unless paragraph 10 (a) is eliminated 10 (b) is void.

their upper surfaces conform with the finished surface of the floor.

18. *Settlement and Expansion Joint.*—A $\frac{1}{2}$ " space or joint filled with the expansion joint filler specified shall be placed between the floor and the walls of the building.

19. *Treatment.*—All wooden forms shall be wetted and metal forms oiled before material is deposited against them.

CONSTRUCTION.

20. *Size of Slabs.*—Forms shall be so spaced that no slab shall contain more than 100 sq. ft. or have any dimension greater than 10'. The floor shall be laid out in slabs of a uniform size except where this is made impossible by obstructions.

21. *Thickness.*—The thickness of the slab shall be at least 5".

CONCRETE.

22. *Proportions.*—The concrete in the base shall be mixed in the proportion of one sack Portland cement to two cu. ft. fine aggregate and four cu. ft. coarse aggregate.

23. *Measuring.*—The method of measuring the materials for the concrete, including water, shall be one which will insure separate uniform proportions at all times. A bag of cement (94 lbs. net) shall be considered one cu. ft.

24. *Mixing.*—The ingredients of the concrete shall be thoroughly mixed to the desired consistency, and the mixing shall continue until the cement is uniformly distributed and the mass is uniform in color and homogeneous.

25. *Machine Mixing.*—When the conditions will permit a machine mixer of a type which insures the uniform proportioning of the materials throughout the mass shall be used.

26. *Hand Mixing.*—When it is necessary to mix by hand the mixing shall be on a water-tight platform and special care shall be taken to turn the materials until the mass is of a uniform color.

27. *Consistency.*—The materials shall be mixed wet enough to produce a concrete of a consistency that will flush readily under slight tamping, but which can be handled without causing a separation of the coarse aggregate from the mortar.

28. *Retempering.*—Retempering, that is, remixing with the addition of water, mortar or concrete that has partially hardened, will not be permitted.

29. *Placing.*—After the addition of water the mixture shall be handled rapidly to the place of final deposit. The forms shall be filled and the concrete struck off and tamped down sufficiently to receive a top of the required thickness. After the concrete has been thoroughly rammed against the cross forms they shall be removed and the material for the next block deposited so as to preserve the joint. In case the floor is not finished in one operation, the forms of the last line of blocks laid shall remain in place until work is resumed.

WEARING SURFACE.

30. *Proportions.*—The mortar shall be mixed in the same manner as hereinbefore specified in the pro-

portion of one sack of cement to one and one-half cu. ft. of aggregate specified for wearing surface.

31. *Consistency*.—The mortar shall be of such consistency that water will flush to the surface only under heavy, thorough working with a wood float.

32. *Placing*.—The mortar shall be spread on the base with a wood float immediately after being mixed and before the base has shown any tendency to harden, but in no case shall more than 45 minutes elapse between the time the concrete for the base is mixed and the time that the wearing surface is completed.

33. *Thickness*.—The wearing surface shall have a thickness of at least 1".

34. *Finishing*.—After the floor has been struck off with a straight edge, it shall be thoroughly worked with a wood float in such a manner as to rub out all air bubbles and to compact the surface. The slab markings shall then be made directly over the joints in the base with a tool that will cut through to the base and completely separate the wearing surfaces of adjacent slabs. The floor shall then be brushed lightly with a stiff broom and finished to a smooth surface with a steel trowel, care being taken to complete the troweling before the mortar begins to harden. Excessive working with a steel trowel must be avoided. In case excess moisture occurs on the surface it shall be taken up with a rag or mop. In no case shall dry cement or dry cement and sand be used, nor shall workmen be allowed to carry this moisture from one slab to the one adjacent.

35. *Color*.—When coloring matter is required it shall be mixed dry with the cement and aggregate until the mixture is of a uniform color.

36. *Protection*.—When completed the floor shall be covered with at least 2" of wet sawdust which shall be kept moist for four days and no one shall be allowed on the floor during that time.

37. *Temperature Below 35° F.*—If at any time during the progress of the work the temperature is, or in the opinion of the engineer will within 24 hours drop to 35° F., the water and aggregate shall be heated and precautions taken to protect the work for at least five days.

Proposed Standard Specifications for Reinforced Concrete Floors*

1. *Cement*.—The cement shall meet the requirements of the Standard Specifications for Portland cement of the American Society for Testing Materials, and adopted by this Association (Standard No. 1).

2. *Fine Aggregate for Concrete*.—Fine aggregate shall consist of sand, crushed stone, or gravel screenings, graded from fine to coarse and passing when dry a screen having $\frac{1}{4}$ " diameter holes; it preferably should be of silicious material, clean, coarse, free from dust, soft particles, vegetable loam or other deleterious matter, and not more than three per cent. shall pass a sieve having 100 meshes per linear inch.

Fine aggregate shall be of such quality that mortar

composed of one part Portland cement and three parts fine aggregate by weight when made into briquettes will show a tensile strength at least equal to the strength of 1:3 mortar of the same consistency made with the same cement and standard Ottawa sand.

In no case shall fine aggregate containing frost or lumps of frozen material be used.

3. *Coarse Aggregate*.—Coarse aggregate shall consist of inert materials graded in size, such as crushed stone or gravel, which are retained upon a screen having $\frac{1}{4}$ " diameter holes, shall be clean, hard, durable and free from all deleterious matter. Aggregates containing dust, soft, flat, or elongated particles shall be rejected.

The maximum size of the coarse aggregate shall be such that it will not separate from the mortar in laying, and will not prevent the concrete from fully surrounding the reinforcement or filling all parts of the forms. The maximum size of the coarse aggregate shall be such as to pass a 1" ring.

4. *Aggregate for Wearing Surface*.—The aggregate shall consist of sand or screenings from granite or other close grained durable rock sufficiently hard to scratch glass, free from loam or other deleterious matter, mixed in the proportion of three parts passing a $\frac{1}{2}$ " ring and retained on a $\frac{1}{4}$ " ring, and two parts passing a $\frac{1}{4}$ " ring and retained upon a screen having 50 meshes per linear inch.

5. *Natural Mixed Aggregates*.—Natural deposits of sand and gravel shall be screened and remixed to agree with the proportions specified.

6. *Water*.—Water shall be clean, free from oil, acid, alkalies and vegetable matter.

7. *Coloring*.—If artificial coloring material is required only mineral colors shall be used.

8. *Reinforcing Metal*.—The reinforcing metal shall meet the requirements of the Standard Specifications for steel reinforcement adopted March 16, 1910, by the American Railway Engineering Association.

9. *Forms*.—Forms should be substantial and unyielding, so that the concrete shall conform to the designed dimensions and contours, and shall be tight to prevent the leakage of mortar.

The supports for floor slabs shall not be removed in less than ten days after the concrete is placed, and then only with consent of the engineer in charge.

10. *Reinforcement*.—The reinforcement shall be free from rust, scale or coatings of any character which will tend to reduce or destroy the bond, and shall be placed and held in position so that it will not become disarranged during the depositing of the concrete.

Whenever it is necessary to splice tension reinforcement the length of lap shall be determined by the engineer on the basis of the safe bond stress, the stress in the bar and the shearing resistance of the concrete at the point of splice; or a connection shall be made between the bars of sufficient strength to carry the stress. Splices at points of maximum stress shall be avoided.

11. *Proportions*.—All concrete shall be mixed in the proportion of one sack Portland cement, two cubic feet fine aggregate, and four cubic feet of coarse aggregate, unless these proportions do not meet the require-

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo., March, 1912; to be voted upon by members in letter ballot.

ments of the law or ordinance under which the work is being done.

12. *Measuring.*—The method of measuring the materials for the concrete, including water, shall be that which will insure separate uniform proportions at all times. A bag of cement (94 lbs. net) shall be considered one cu. ft.

13. *Mixing.*—The ingredients of the concrete shall be thoroughly mixed to the desired consistency, and the mixing shall continue until the cement is uniformly distributed and the mass is uniform in color and homogeneous.

14. *Machine Mixing.*—When the conditions will permit a machine mixer of a type which insures the uniform proportioning of the materials throughout the mass shall be used.

15. *Hand Mixing.*—When it is necessary to mix by hand the mixing shall be done on a water-tight platform, and special care taken to turn the materials until the mass is of uniform color.

16. *Consistency.*—The materials shall be mixed wet enough to produce a concrete of such a consistency as will flow into the forms and about the metal reinforcement when used, and which, at the same time, can be conveyed from the mixer to the forms without the separation of the coarse aggregate from the mortar.

17. *Retempering.*—Retempering, that is, remixing with additional water, mortar or concrete that has partially hardened will not be permitted.

18. *Placing.*—When it is necessary to make a joint in a floor slab its location shall be designated by the engineer. Mortar composed of one part cement and two parts sand shall be placed on the floor of the form to a depth of at least $\frac{1}{2}$ " and spread in a manner which will eliminate air and water bubbles. Immediately after placing the mortar the concrete shall be placed and thoroughly worked around the bars and into the recesses of the forms, and shall be brought to a surface 1" below the finished surface of the floor. As soon as the slab has hardened sufficiently to permit of workmen being upon it, and before it has dried out, the wearing surface shall be applied.

WEARING SURFACE.

19. *Proportions.*—The mortar shall be mixed in the same manner as hereinbefore specified in the proportion of one sack cement to one and one-half cu. ft. of aggregate specified for the wearing surface.

20. *Consistency.*—The mortar shall be of such consistency that water will flush to the surface only under heavy, thorough working with a wood float.

21. *Placing.*—The wearing surface shall be placed immediately after mixing.

22. *Thickness.*—The wearing surface shall have a minimum thickness of 1".

23. *Finishing.*—After the floor has been struck off with a straight edge, it shall be thoroughly worked with a wood float in such a manner as to rub out all air bubbles and to compact the surface. The floor shall then be brushed lightly with a stiff broom and finished to a smooth surface with a steel trowel. Care must be taken to complete the troweling before the mortar begins to harden. Excessive working with steel trowel must be avoided. In case excess moisture occurs on the surface it shall be taken up with a rog or mop. In no case shall dry cement, or dry cement and sand be used, nor shall workmen be allowed to carry this moisture from one slab to the one adjacent.

24. *Color.*—If artificial coloring is used it must be incorporated with the entire wearing surface.

25. *Protection.*—When completed the floor shall be covered with at least 2" of wet sawdust which shall be kept moist for four days, and no one shall be allowed on the floor during that time.

26. *Temperature Below 35° F.*—If at any time during the progress of the work the temperature is, or in the opinion of the engineer will within twenty-four hours drop to 35° F. the water and aggregate shall be heated and precautions taken to protect the work for at least five days.

Books Received

Cement Pipe and Tile. By E. S. Hanson. Pages 151. Size $5\frac{1}{4}$ by $7\frac{3}{4}$. Bound in cloth. Cement Era Publishing Co., Chicago, Ill.

This is the second edition of a work which appeared first about three years ago, and in the preface to the new edition, the author says, in spite of the very short time which has elapsed since the appearance of the earlier work, the development in the manufacture and use of cement pipe and tile has grown to such an extent that many new matters are presented.

* * *

Directory of Portland Cement Manufacturers. Compiled and published by Cement Era. Pages 250. Size $3\frac{1}{4}$ by 5. Price, leather, \$1.00.

This is the sixth annual edition of this directory, which is already very well known to the trade. It contains a list of Portland cement manufacturers, list and location of mills with a map, a list of officers, superintendents and chemists of cement companies, and the book also includes a list of gypsum companies and lime companies.



The smokestack that sticks up out of the clouds of smoke in the illustration is of concrete and it is the only thing that remains of the plant of the Industrial Cotton Oil Co., Houston, Texas. This burned January 6 and, after several hours in the midst of a roaring furnace of highly combustible buildings and contents, the concrete stack still remained. It is significant comment in this connection that the company proposes to rebuild the entire plant of concrete.



Inquiries regarding sand and all other materials are cheerfully answered, like all other questions, but in cases of importance it is best to invest in a laboratory analysis. Write to us for particulars, address, Laboratory Department.

To Prevent Sticking

What do you suggest that I use on metal forms to prevent wet concrete from sticking to them? D., Ohio.
See advertising pages of CONCRETE.

* * *

Long Column Forms

I have a customer who wants columns 14' long to use in the construction of a house. This length must not include either the base or capital. With these the length must be 16' with a diameter of 22" at the base and 19" at the top. Do you know of a mold made to turn out a column of this size? W., Ohio.

There is no firm manufacturing a mold for concrete columns that will turn out a single stone column 14' in length. The longest single column we believe is about 8' long. See advertisements of such molds in CONCRETE.

* * *

Doors for Silos

Please give me some information as to doors for concrete silos. I am going to build a silo of concrete block and I do not know about the doors and framing. R., Illinois.

We suggest that you look through the advertising pages of CONCRETE and write to those who advertise silo construction. We also suggest that you write to the Universal Portland Cement Co., 72 West Adams St., Chicago, for a bulletin on the subject of silo construction, and to the U. S. Department of Agriculture, Washington, D. C., for a booklet on the same subject.

* * *

Magnesia Content of Cement

At a recent meeting here of a local organization, the magnesia content of Portland cement came up for discussion, and it was suggested that we obtain opinions from the outside as to what results could be expected from the use of Portland cement which contained magnesia up to 7 per cent. There has been contention on both sides as to magnesia content above 4 per cent, and we should like your view of the matter. I., Washington.

We suggest that you correspond with Richard K. Meade, Nazareth, Pa., and with S. B. Newberry, Sandusky, Ohio. Both Mr. Meade and Mr. Newberry have carried out elaborate experiments along the line in which you are interested, and will, without doubt, give you valuable information.

Mixture for Fence Posts

I am going into the fence business and I should like to know whether to use $\frac{3}{4}$ " crushed rock or gravel just as it comes from the bank with all the large stones taken out that do not pass through a 1" screen. What aggregate makes the best post? G., Ohio.

Crushed stone of the $\frac{3}{4}$ " size probably will make a better post than gravel as it comes from the pit. You will, of course, have to use a fine material with the stone in order not to waste cement in filling up the voids in the stone. We do not know what kind of post you propose to make; that is, what molds you are using, but the manufacturer of the mold is in position to give you excellent advice as to the mixture which will secure the best results.

* * *

Repairing Floor

In our electric light plant a quantity of sulphuric acid was spilled on the concrete floor and we should like to know how to repair the floor. The acid cut the cement quite badly on the surface, and the floor is left in a very weak and grainy condition. I tried to repair it by putting on a 1:2 mixture of cement and sand but this wore off immediately. M., Kansas.

We suggest that the concrete surface which has been injured by sulphuric acid cannot very well be repaired by the use of a thin coat of mortar. It will always wear off just as you say it did when you tried it. You will have to chisel away the concrete which has been effected by the acid to a depth of at least $\frac{1}{2}$ ". Clean off the surface carefully, wet it down well, and then trowel in a new top surface for the floor.

* * *

Natural Cement

I should like some information as to the Rosendale cement. In cementing off the water in an oil well it sometimes takes three or four hours from the time the cement is first mixed in the grout to finish the job, and all this time the entire mass is kept in motion. I think it is for this reason that the work is so often a failure. Wouldn't a natural cement be better for this purpose? S., California.

Rosendale cement is made by the Consolidated Rosendale Cement Co., 50 Church St., New York City.

We suggest that you write to the manufacturers for information as to Rosendale cement, but it does not seem reasonable to suppose that a natural cement, which sets more quickly than Portland cement, would give you better service in the work which you are doing. Some Portland cements set more slowly than others.

* * *

Why Did Walk Fail?

I have put in a sidewalk 6' wide and 4" thick and it stood up about a week, then cracked near the middle across the walk. I used a good brand of Portland cement and I put in the top dressing $\frac{3}{4}$ " thick immediately after the base was

put in. The base consisted of 1 part cement and 8 parts gravel, and the top dressing 1 part cement and 2 parts sand. The ground on which the sidewalk is built is hard, not very dry, but solid. The weather was cloudy and there was some rain and one frosty night. It cracked on the frosty night. The forms had not yet been taken away when it cracked. What is the matter with the walk? R., Oregon.

The difficulty may have been brought about by any one of several causes. It is just possible that your gravel was not well graded, but it seems more likely, under the circumstances, that frost caused the crack. It is important in freezing weather to protect concrete from the cold.

* * *

Determining Voids

In a recent issue of CONCRETE (May, 1911), I saw your answer to a question about determining voids in sand. Can you give me some further information along this line? P., Canada.

As indicated in our May, 1911, issue, we run this sand through a nest of sieves and then we plat the curve, using the maximum diameter for the longitudinal coordinates and the percentage passing sieves for the vertical coordinates. This curve is, of course, plated in a parallelogram, the diagonal of which of course represents a voidless sand. Comparison of the curve plotted from the sample analysis with the nom, gives us the exact percentages which want to be added to or subtracted from the sample in order to make it coincide with the nom or ideal curve.

* * *

Walls of Stucco

Some time ago I wrote you about a plan which I had to build a concrete kitchen on my house. I would like a little more information. My plan is to use 4" x 4" studding, 1' 6" apart, reinforced by iron rods 1' apart, with 3" or 4" of concrete on the outside, matched boards to be used on the inside of the studding. The room is to be 14' x 16' and 8' high. Should I use dry or green studding? P., Minnesota.

We do not approve of your plan, because it is very bad practice, under ordinary circumstances, to embed wood studding in concrete. We believe you can do the work much more cheaply and certainly do it much better by following the plan which we suggested in this department, April, 1911.

Set up the studding as for a frame house, put expanded metal lath on the outside and on the inside of the studding, too, if you like, in order to give a double concrete wall with a hollow space between.

* * *

Molds for Poles

Will you please supply me with the addresses of manufacturers of molds for making concrete telephone and telegraph poles? B., Illinois.

We do not know of any such molds on the market.

There have been many designs for concrete poles and molds have been made for them by those using

the poles, as usually there is nothing particularly complex in making a wood form for this work.

It is just possible that the American Concrete Pole Co., Richmond, Ind., has a mold for sale. This company has made many poles. We also refer you to the Concrete Pole Co., St. Catharines, Ontario; A. C. Chenoweth, Brooklyn, N. Y., and to the Henbique Construction Co., New York City.

A pole newly designed by the Stone & Webster Engineering Co., El Paso, Texas, was described and illustrated in the January, 1912, issue of CONCRETE.

We also suggest that you write to the Standard Cement Pole Co. of America, 25 Broad St., New York City, which has a patent system of construction.

* * *

Concrete Brick for School

I am in the concrete block business and I also make concrete brick. A new schoolhouse is to be erected here and it is proposed to use red pressed clay brick. I would like to know if there is any good reason why concrete brick should not be used for a facing material instead of pressed clay brick in this case. F., Ohio.

We hope you will succeed in persuading the School Board to use concrete brick instead of clay brick to face the new school building.

In this connection we know you will be very much interested in an article which appeared in the February, 1912, issue of CONCRETE on the growing use of concrete brick.

There is certainly an increasing demand for concrete brick, and as it can be furnished in practically any color and if properly made is much more dense than clay brick, there is no reason why it should not be a superior building material.

* * *

Repairing Frame House

We are going to revive an old frame house by putting on a covering of stucco just as soon as the weather will permit of this work. We should like information about mixing a waterproofing compound with the last coat of stucco, and also as to how the stucco should be applied. G., Ohio.

The last coat of stucco should be sticky, and the way it is to be put on depends altogether upon the surface you would like to obtain. If you want a fine, smooth texture you will have to have a fine, smooth mixture, and if you want a rough stucco, which many people prefer, pebbles will have to be introduced. If a rough surface is wanted the mixture is thrown against the wall from a paddle, and you will readily see that if the mixture is going to stick when thrown it will have to be sticky.

As to the waterproofing compound being mixed with the last coat of stucco, this depends altogether upon the kind of waterproofing you use, and we refer you to advertisers in CONCRETE. Any one of these advertisers will be glad to give you information as to how to use his product in the work which you are doing. For complete details as to stucco work we recommend the book *How To Use Concrete*. Price \$1.00.

Making Tank Acid Proof

What substance can you suggest that, when applied to a concrete container, will help to make the container acid proof? I want to have a concrete container made to hold about 5,000 gallons to be used as an equalizer for wine. Wine contains about 1 per cent. of acid. It is therefore necessary to use a coating which will not interfere with the taste of the wine. The wine will be left in the container not longer than 24 hours. L., Ohio.

In answer to your question, R. A. Plumb, of the Michigan Technical Laboratory, says:

I have no encouraging suggestion to offer. Our position is influenced by our natural timidity in the use of concrete for conditions where it will be subjected to the action of any liquid or gas of an acidic nature, supplemented by our knowledge of the weakness of practically all superficial coatings to withstand the conditions which are essential efficiently to protect the concrete from contact with the disintegrating acidic body.

In the proposed condition, although the acid is particularly weak, and undoubtedly good, dense concrete would be more or less immune, if a good interval were allowed for its perfect hardening, yet there is the possibility for some action. We cannot recommend any superficial coating that would be applicable to a concrete surface that would withstand the alternate wetting and drying and be durable and not in any way impart a taste, or injure the wine.

* * *

Drain Tile, Samples of

I am sending you two samples of concrete drain tile. No. 1 was made about six months ago of a mixture of 1 part Portland cement and 4 parts bank sand, made very wet. However, there seems to be quite a high percentage of clay in the sand. No. 2 was made about three weeks ago of a mixture of 1 part cement and $3\frac{1}{2}$ parts sand. This sand was a mixture of bank sand and lake sand. These tile were sprinkled three times a day in the curing room for six days and then they were put out in the yard and watered again for six days, after which they were piled up. Do you think No. 2 sample is all right, and what do you think is the matter with the No. 1 sample? Do you think that the difficulty may have been that the tile were frozen? Do you think there is something wrong with the materials? A., Minnesota.

In our judgment the difficulty is due to two things. In the first place, your sand is very much too fine and much too dirty. The tile give no evidence of having been frozen, but examination under a glass shows that every grain of sand is coated either with clay or similar material which has prevented it from bonding.

If you care to, we should be very glad to have you send on a sample of the sand used when we can probably tell you more about your difficulty. There is no charge for information of this kind, unless you care to have a laboratory analysis made of your sand, in which case our charge will be \$6.00.

* * *

Walk Failure

I would like to know what it is that makes the wearing surface of concrete walks crumble and disintegrate. I have just laid several hundred feet of walk. The bottom course was mixed 1:6 and the top coat mixed 1:2½. I used a good quality of sand and gravel and a good brand of Portland cement. In a few days after the walks were opened up to traffic particles began wearing off the surface. There are three or four different jobs in the same city block and they all show this same wear. Concrete walk laying is not new to me. I have done the work successfully for two years. I own my own gravel and sand pits and select the material very carefully, and this same material has been used on jobs which have been all right. I have a competitor in the business who put down

a walk very near the one I put down, and I sold him the sand and gravel with which to lay his walk. His walk seems to be all right. I am almost inclined to think someone has tampered with my sand. It is a matter of great annoyance to me. Could the concrete be tested to see what is the matter with it? C., Texas.

The most common cause of this difficulty is the fact that the top dressing is made too rich so that particles of neat cement rise to the surface where they are easily worn off under traffic.

From what you tell us of your mixture, however, and from the fact that you are a sidewalk maker of experience, this possible cause seems scarcely probable in your case. All that we could do at long distance would be to guess at your difficulty.

If you care to send us a sample of the concrete by prepaid express, we shall be very glad to give you the benefit of whatever examination we can make of it. There will be no charge for this unless a laboratory test is necessary, and if we find that this is required we will notify you and give you an estimate of the cost before proceeding with it.

* * *

Making Strong Tile

Will concrete tile of 1:4 mixture cement and coarse sand made by the ordinary pour process by hand be strong enough to use in drain culverts on wagon roads where 4- and 5-ton traction engines travel? The 15" tile are made 1½" thick, and the 24" tile 2" thick. How much fill should there be over these tile so that they will stand the load? What load should well seasoned tile of these thicknesses and diameters carry? F., Nebraska.

We referred your question to a member of the Board of County Road Commissioners of Wayne County, Mich., this board having had considerable experience in the use of concrete tile drains, which are made by the board. We have an answer from the engineer of the board, Geo. A. Burley, as follows:

The thicknesses given for the 15" and 24" tile are the same as used by us on our roads. Our mixture, however, is a 1:3 instead of a 1:4, which, being a denser mixture, will give us a stronger tile, and we do not believe any too rich a mix.

The load that concrete tile will stand in a road of course depends upon the following:

1. Grade of cement used.
2. Cleanliness of material used.
3. Thickness of the tile.
4. Proportion of mixture used.
5. Amount of water in mix.
6. Age of tile.
7. Whether kept moist when setting.
8. Whether trench is shaped to fit tile.
9. Tamping of the back fill.
10. Nature of the earth.
11. Whether reinforcement is embedded in the tile.

All these factors affect the strength of tile in a road and it is hard to advise what depth to place the tile with any degree of accuracy. We make and lay our tile after the most approved methods. Our tiling force is in charge of an experienced man who is instructed to dig the trench to such a depth as to have at least two feet of earth over the top of the tile. The shape of the bottom of the trench is made to conform to the shape of the tile, and the back filling is well tamped. By following this method of laying, our tile have stood up under 10- and 15-ton engines.

* * *

Wall Moisture Proof

Does a solid concrete wall for a dwelling house absorb moisture? In other words, is such a wall for a dwelling house unhealthful? I should like to know whether or not

it is necessary to have an air space in a concrete wall for a dwelling house, or can a good wall be built of concrete block which have hollow cores so that the air space in the wall is not continuous? E., New York.

Concrete is nowhere near so prone to the absorption of moisture as is clay brick. With a good, clean, well graded aggregate and plenty of water, a mixture of concrete may be made which, when hard, will absorb a very small percentage of moisture.

For instance, the building code of the city of Detroit requires that concrete block used in this city shall not absorb more than 5 per cent of their weight when immersed for 48 hours, and block are being made in this city which absorb only about 3 per cent.

It is commonly known that absorption tests on clay brick run from 10 per cent up. The conditions under which concrete is made in bulk form on the ground, however, make it more difficult to secure a very dense wall—not by any means impossible but more difficult—so that in practice solid walls will absorb more moisture than concrete block which are properly made and cured under factory conditions.

CONCRETE hears very frequently of dwelling houses built of concrete block in which the interior plastering is done direct on the block walls, and in which no moisture penetrates. Hollow walls are to be recommended, however, because the dead air space supplies an insulation which not only keeps moisture from coming through, but which keeps cold out in winter and the heat out in summer. So we say that the more hollow space in the wall, the better is the wall from this viewpoint, and that if a double concrete wall is built so that the air space is continuous all around and up and down, such construction is ideal.

* * *

Washing Gravel

I have a small quantity of gravel to wash, not enough to make it worth my while to install a regular washing plant. Can you give me some information as to how to proceed, and tell me about what the work will cost? B., Pennsylvania.

If you haven't a large quantity of gravel to wash, we suggest that you build a box about 8' wide and 15' long with the bottom having a slope of 8" in the 15'. The walls of the lower end of the box are to be about 8" high and those of the upper end about 3' high, sloping of course from 3' to 8". The lower end of the box should be closed with a wide gate 6" high sliding in grooves so that it may easily be removed.

Dump about 3 cubic yards of your gravel into the upper end of the box and play a stream of water from the hose on the pile. The finer sand will gradually work to the lower end of the box, and the dirt will be washed out and flow over the gate at the end.

It should take about an hour to wash a 3 cubic yard batch and with a man working at \$1.50 a day,

the cost of washing gravel should be about 5 cents per cubic yard. The gravel will have to be shoveled into the box and from it again, and this will cost about 10 cents per cubic yard, making a total cost of 15 cents per cubic yard for washing and shoveling. Of course, if you have large quantities of gravel to wash, there are special washing equipments which are more economical.

* * *

Tank for Fuel Oil

I propose building a concrete tank to contain fuel oil and I should like to have you give me some information as to the proper thickness of the walls and bottom, size and spacing of reinforcement, and reinforcing to use. The tank is to be 20' x 20' x 12', with 6' of the depth underground. Can such a tank be built of concrete and hold oil indefinitely and at the same time keep out water? What time do you suggest a tank be given to harden properly? M., Canada.

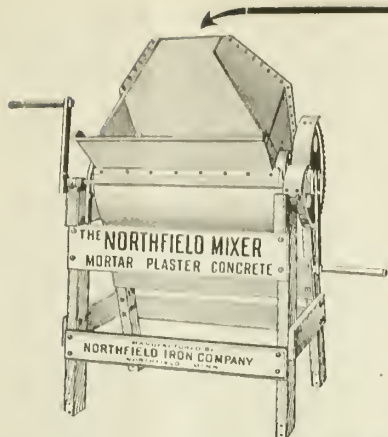
We refer you to the Information Department of CONCRETE, July, 1911, which contains complete instructions as to reinforcing a round tank 9' 6" deep, and another set of instructions for a rectangular tank 13' deep, the depth of the contents of the tank, of course, chiefly influencing the reinforcing of the walls. The depth of the column of liquid determines the pressure on the walls.

A round tank is constructed more economically than a rectangular tank, but as rectangular tanks are easier to build on account of the simpler form work, most people build them that way. If the concrete walls of the tank are made thick enough, it will not be necessary to reinforce these walls where they are underground, if the earth is firm. That portion of the tank which is above ground must be reinforced unless you want extremely heavy construction.

In the October, 1911, issue of CONCRETE we gave considerable information as to precautions which should be taken in constructing tanks of concrete to contain mineral oils. The mixture should be ordinarily about 1:2:3 of cement, sand and crushed stone. Great care should be taken and if necessary some experiments made beforehand to obtain the densest possible mixture of concrete. Care should also be taken to see that the stone used, and also the sand, are perfectly clean, because any silt or vegetable matter will result in porous, weak concrete.

A wash of neat cement on the inside of the tank ordinarily is given for waterproofing purposes, but "to make sureness doubly sure" it might be well to use some good waterproofing compound in the concrete. The best practice in the construction of tanks to contain mineral oils requires that the tanks remain for two or three months before the oil is put in. When the concrete has set, it is well to keep it moist so that the hardening process will continue.

We also refer you to an article published in the March, 1912, issue on the construction of concrete cisterns, both underground and on top of the ground. This, together with the advice as to additional precautions necessary to be taken when the tank is to contain mineral oil, surely will help you.



Mixes 4 cubic foot batches at the rate of one batch per minute; 1½ horsepower engine runs it; two men turn it easily and don't work as hard as the shovellers. It successfully mixes surfacing, color blending, mortar, hair plaster and all kinds of concrete. It weighs only 300 lbs. Can always be set to discharge direct into forms.

Sold on Trial.
Send for FREE Catalogue.
Manufactured by
NORTHFIELD IRON COMPANY
406 Water St.,
Northfield, Minn.

-The Auxiliary Ratchet Lever: insures more Power, than the ordinary one lever bender. Our BAR BENDER No. 5 is specially valuable in Reinforced Concrete work.. Portable, instantly adjustable to all shapes of stock up to 1½". Send for booklet of all sizes of improved bar, eye, "U" and ring benders.

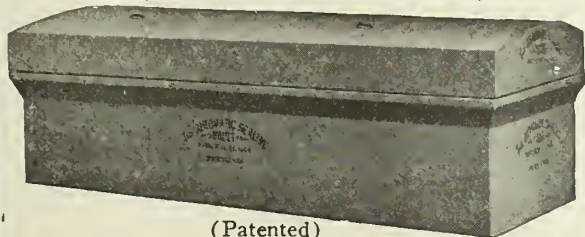


WALLACE SUPPLY CO.
114 No. Jefferson St. Chicago
25 Cortland St., New York City

Highest Pinnacle of Perfection

This is what our Automatic Sealing Vault and Adjustable Steel Molds stand for today. The Automatic Sealing Vault has from the first met with universal favor and the already big demand for it is rapidly increasing. Sells on its own merits and always overcomes competition. Easy to make and easy to handle and provides big profit for the manufacturer.

(More beautiful than stone or steel.)



(Patented)
(As enduring as the ages.)

Read this letter: Lisle, N. Y., Feb. 24th, 1912.
The Automatic Sealing Vault Co.,
Peru, Ind.

Dear Sirs:—

Yours of the 7th received and in reply will say that I am having excellent success with your molds. They are all you claim for them, and I am well pleased with the sales I am having. The Undertakers are willing to discard all other cement vaults for the sales of the Automatic Sealing Vault.

I could never feel satisfied with a vault when you have to depend on paint or cement for a seal, as I feel sure that in time water will find its way through, but when you place a cover on the Automatic Sealing Vault, you know you have a seal that will forever last.

Yours truly,
EDWARD J. LUSK.

Our Big Illustrated Catalogue fully describes this vault and molds and other devices, which will interest you. Write today.

The Automatic Sealing Vault Co.

Peru, Ind.



Administration Building and Power House at Sault Ste. Marie Locks, Michigan. Asbestos "Century" Shingles specified by the U. S. Engineer Corps—applied by the Saginaw Sheet Metal Works. Illustration reproduced from an artist's sketch.

THE professional opinion of the United States Engineer Corps is back of you every time you recommend—

Asbestos "Century" Shingles

"The Roof that Outlives the Building"

The Engineers designed the Administration Building at Sault Ste. Marie Locks for their own occupancy. They specified the Asbestos "Century" Shingle roof.

Furthermore, these Shingles were submitted to the most searching test ever imposed on a roofing. They were plunged into cold water while red-hot.

The United States Government is one of the largest consumers of Asbestos "Century" Shingles in the world.

You can get Asbestos "Century" Shingles in shapes to suit new architectural style—in several sizes—and in three colors: Newport Gray (silver gray), Slate (blue black) and Indian Red.

Send for quotations and booklet "Keasbey 1912."

Keasbey & Mattison Co.

Factors
Ambler, Pennsylvania

Branch Offices in Principal Cities of the United States.

N. A. C. U.'s Successful Convention

(Continued from Page 30)

the manufacturer of clay tile. It must be said that there is often a tendency on the part of organizations toward ultra-conservatism in specifications for concrete products. Quite frequently the provisions suggested appear to contain a rather high and apparently empirical factor of safety. Concrete should obviously be manufactured under conditions that will insure a perfect product, but specifications should not be made hastily nor as the result of anything but a sufficiently large number of laboratory and field tests.

G. H. Daugherty, of the D. & A. Post Mold Co., Three Rivers, Mich., contributed to the discussion that followed the remarks of Mr. Sims. Mr. Daugherty feels that in general too much is expected of concrete posts made haphazard. Like other manufacturers, he knows that concrete posts, properly made, possess almost innumerable advantages over other posts, but they must be well made to stand the strain of handling and use. He suggested that the N. A. C. U. would do well to appoint a committee on fence posts, either making it a special committee or a sub-committee of the committee on concrete products, and this will be done before the next convention meets. A. M. Smith, of the Ohio Post Mold Co., Toledo, O., joined with Mr. Daugherty in urging the advisability of appointing such a committee.

At the same session, President Humphrey read two papers, dealing with poles and posts of concrete. The first was "Some Notes on the Value and Comparative Cost of Reinforced Concrete Telegraph Poles," written by George Gibbs, consulting engineer, Pennsylvania Railroad, New York City, and the other, "Concrete Fence Posts," written by W. J. Towne, engineer of maintenance, Chicago & Northwestern Railroad. L. J. Hotchkiss, assistant engineer, Chicago, Burlington & Quincy Railroad, read his own paper on the same subject, in which he described and illustrated what the Burlington is doing in the matter of good fences.

Rudolph J. Wig, assistant engineer, Bureau of Standards, Washington, D. C., read an interesting paper on "Comparative Tests of the Strength of Concrete in the Laboratory and in the Field," which brought out the fact that laboratory tests almost invariably showed higher than those in the field, though occasionally some field contractor would turn out concrete that would test higher than the laboratory product. It would seem that the wise thing to do is to urge upon contractors the necessity of keeping careful record of quantities and character of material used, including especially water, methods of mixing and placing and methods and duration of curing. There is always some perfectly good reason for concrete that tests high, and that is really the thing we are all after. The morning session was brought to a close with a paper read by Robert F. Havlik, engineer, Ideal Concrete Machinery Co., South Bend, Ind., on "Modern

Methods of Manufacturing Concrete Products." The paper was comprehensive and began at the bottom of things. It was heard with close attention, at the end of a somewhat long session.

Large construction work came in for its share of attention Saturday night, when Frederick C. Noble, division engineer, Public Service Commission, Brooklyn, N. Y., read a paper on "The Use of Concrete in the Fourth Avenue Subway, Brooklyn, N. Y." This was illustrated with the lantern and showed a number of interesting problems that were solved by the use of concrete. The comparatively small user of concrete was mentioned by W. A. Collings, engineer, Builders' Material Supply Co., Kansas City, Mo., in his paper on "Reinforced Concrete in Agriculture." Owing to his absence, the paper of S. B. Williamson, engineer, Pacific Division, Panama, on "The Handling of Concrete in the Construction of the Panama Canal" was not read, but the slides which had been prepared to show the progress of the work on the big canal were thrown on the screen.

The formal program of papers was brought to a close by P. H. Bates, chemist, Bureau of Standards, Pittsburgh, Pa., who contributed one on "The Present Status of Iron Portland Cements," and a paper on the same subject by Herman E. Brown, chief engineer, American Cement Engineering Co., New York City, read by President Humphrey. This matter of iron cements is one of the highest importance to the industry, since cements in which the alumina content is to some extent replaced with iron oxide, behaves better in the presence of sea water than do many of the Portlands.

After the resolutions committee had thanked everybody for everything and suggested that the Association could do good work in investigating aggregates, highway bridges and culverts, nomenclature, size of drawings and specifications for concrete fence posts, it was felt that it was time to adjourn. The convention accordingly rose at 9:50, after what was certainly the most successful meeting in the history of the national Association.

The program was well diversified and the papers were well prepared. Lively discussions followed many of them, showing that new ideas had been presented. Every man present had a full opportunity to talk, and most of the members who were consistent in their attendance could go home with the certainty that the time they had spent was profitably invested.

The Wyandotte Portland Cement Co., Wyandotte, Mich., has issued a book entitled *Good Roads*, in which text and picture show quite plainly what may be done with concrete in the construction of roads and pavements, culverts and so on, of concrete.

* * *

The publication of pads of isometric drawing paper is announced by the Norman W. Henley Publishing Co., New York City. This paper comes in various sizes and is printed in faint green cross lines on white paper, so that drawings may be made in perspective scaled in three dimensions. This paper makes it very easy to lay out a drawing to be followed by a pattern maker, for instance, with every detail on one sheet.



The Residence of a Millionaire

No longer are Ideal concrete blocks regarded as merely cheaper than wood and therefore looked upon as a substitute. They are recognized as absolutely the best construction material in the world. This residence on the Barber estate, at Barberton, Ohio, was constructed entirely of Ideal concrete blocks. Mr. Barber is a millionaire many times over and the question of cost was not a factor in the matter at all. Quality, and quality alone was the sole motive of deciding upon Ideal concrete blocks.

A Permanent Success

in the manufacture of concrete blocks and specialties can only be had by installing machinery that always produces perfect products.

Ideal Machinery Never Disappoints

If you desire to engage in a profitable business that will increase in volume yearly, **Buy Ideal Concrete Machinery.**

If you have been making concrete blocks that are not up to the standard, there is a way to quickly regain lost prestige, **Buy Ideal Concrete Machinery.**

If you want the reputation of a reliable maker to help you get business, **Buy Ideal Concrete Machinery.**

We issue several special booklets, any of which will be mailed upon request, but our new complete catalog is the most valuable concrete volume ever printed. It digests the subject entirely and within its covers will be found everything that a concrete manufacturer should know. We ask a deposit of one dollar for this book, to keep it out of collectors' hands, but upon receipt of your first order amounting to Ten Dollars (net) or over, we will give you a credit of Two Dollars. Thus we are really paying actual customers a dollar each to send for this encyclopedia of concrete.

If you are seriously considering the matter of going into the profitable business of manufacturing concrete blocks and concrete specialties, by all means send for this big book—the book that explains everything.

Ideal Concrete Machinery Company

403 Emerick Street, South Bend, Indiana

London, Ontario, Canada.

Chicago Office—1075 Old Colony Building.

New York Office—1958 Hudson Terminal Building.

Architects are referred to Sweet's Index, pages 28 and 29.

A Part of the Ideal Line

Ideal Model "A" Block Machine, made in five different sizes. Attachments interchangeable on any Model "A" Base.

Ideal Model "E" Block Machine, made in five different sizes. Attachments interchangeable on any Model "E" Base.

Ideal Automatic Tampers.

Ideal Scrapers and Finishers.

Ideal Material Feed Tables.

Ideal Steel Hoppers.

Ideal Power Batch Mixers

Ideal Continuous and Proportioning Mixers.

Ideal Solid or Hollow Veneer Block Machines.

Ideal Sill and Mantle Machines.

Ideal Spanish "S" Roofing Tile Machine.

And the catalog gives many more.

"If it's made of concrete we make machinery to make it."

Ideal Life Guarantee

The Ideal Concrete Machinery Company guarantees all Ideal Concrete Machines free from defects, in material or workmanship, and will replace, free of charge, any defective material when returned to its factory for inspection, transportation, prepaid. This guarantee covers and protects original purchasers only.

Please send me your 160 page book, Ideal Concrete Machinery, for which I enclose One Dollar, it being distinctly understood that with my first order of any goods of your manufacture, amounting to ten dollars (net) or over, you are to allow me a special credit of two dollars.

Name

Address

City State

Proposed Standard Specifications For Concrete Stone, Block and Brick*

Concrete architectural stone, building block and brick must be subjected to compression and absorption tests. The test samples must represent the ordinary commercial product of the regular size and shape used in construction.

Compression Test.—(a) In the case of solid concrete stone, block and brick the ultimate compressive strength at 28 days must average 1,500 lbs. per sq. in. of gross cross-sectional area of the stone as used in the wall, and must not fall below 1,050 lbs. per sq. in. in any case.

(b) The ultimate compressive strength of hollow and two-piece building block at 28 days must average 1,000 lbs. per sq. in. of gross cross-sectional area of the block as used in the wall, and must not fall below 700 lbs. per sq. in. in any case.

(c) In the case of hollow building block the gross cross-sectional area shall be considered as the actual wall area including the block and air space displaced by the block.

(d) In the case of two-piece block the block shall be tested in pairs consisting of the front and rear block as used in the wall. The compressive strength shall be regarded as the sum total sustained by the two block divided by the product of the length of the block and the width of the wall.

Absorption Test.—The percentage of absorption at 28 days (being the weight of the water absorbed, divided by the weight of the dry sample) must not exceed 5 per cent when tested, as hereinafter specified.

STANDARD METHODS OF TESTING.

General. (a) *Laboratory.*—All tests required for approval shall be made in some laboratory of recognized standing.

(b) *Samples.*—For the purpose of the tests at least nine samples or test pieces must be provided. Such samples must represent the ordinary commercial product, and shall be selected from stock. In cases where the material is made and used in special shapes or forms too large for testing in the ordinary machines, smaller size specimens shall be used as may be directed.

(c) *Tests.*—Tests shall be made in series of at least three. The remaining samples are kept in reserve in case duplicate or confirmatory tests be required. All samples must be marked for identification and comparison.

Compression Tests.—The compression tests shall be made as follows:

(a) *Solid concrete stone, block and brick.*—When testing solid concrete stone, block and brick, the net area shall be considered as the minimum area in compression.

(b) *Hollow and two-piece building block.*—Whenever possible such tests shall be made on full size

block.—Whenever such tests must be made on portions of block, both pieces of the block must be tested and both must contain at least one full web section. The samples must be carefully measured, then bedded flatwise in plaster of paris to secure uniform bearing in the testing machine and crushed.

The net area shall be regarded as the smallest bearing area of the piece being tested. The total compressive strength shall be divided by the net area to obtain the compressive strength in lbs. per sq. in. of net area of each piece. The sum of the two results shall then be averaged to obtain the average strength in lbs. per sq. in. of the net area of the total block.

The entire block shall be carefully measured to determine the maximum air space prior to breaking the block for the compression tests, and the net compressive strength obtained shall then be reduced to compressive strength in lbs. per sq. in. of gross area, this being figured from the actual air space of the block determined above.

Absorption Tests.—The sample is first thoroughly dried to a constant weight at not to exceed 212° F. and the weight carefully recorded. When dried, the sample is to be immersed in a pan or tray of water to a depth of 2" resting on two strips not over 1" in width to allow the water to have free access to face. At the end of 48 hours from the time it is placed in water, the sample shall be removed, the surface water wiped off, and the sample carefully weighed.



The house shown with illustration was built by the owner, Peter Helfrich, Spencerport, N. Y., and represents an attractive type of concrete block construction. The first story is of broken ashlar, each block being faced with crushed granite; second story plain faced block with rock trimmings; columns and balustrades are of a design that blends perfectly with the general construction of the building. Mr. Helfrich is a firm believer in the value of concrete as a general building material. He is one of the pioneers of the industry, having produced some of the first block made in western New York. The block used in the construction of this residence were made on a Hercules machine. The house is 38'x40'.

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo., March, 1912; to be voted upon by members in letter ballot.

Stop That Leak

With

"Anti-Hydro"

"Anti-Hydro" is the only positive and permanent water-proofing material in the market. It is a liquid which makes cement water, dust and acid proof. It will overcome the most difficult waterproof engineering problems, and has never failed to produce an absolutely tight surface. Because of its acid-proof qualities, it is especially adapted for use on floors in laboratories, factories, etc., where acids are freely handled.

L. J. Buckley & Co.

General Sales Agents,

256 Broadway, New York City, N. Y.



AN EDWARDS INTERLOCKING METAL SPANISH TILE ROOF

WILL OUTLAST YOUR BUILDING

Artistic and Ornamental in appearance and is positively guaranteed to be Fire, Lightning, Rain, Storm and Wind proof.

Its extreme lightness (about one-eighth that of slate), durability and moderate cost commend it to those wishing something out of the ordinary in roofing.

Manufactured from best quality Worcester Grade Terne Plate, furnished painted or galvanized (galvanized after formation) size 10x14 inches.

The Edwards Manufacturing Co.

"THE SHEET METAL FOLKS"

404-444 Eggleston Ave., CINCINNATI, OHIO

The World's Largest Manufacturers of Metal Roofing, Metal Shingles, Metal Ceilings, Etc.

Send for New Free Roofing Book showing our complete line of Metal Roofing, Siding, etc.



Sales of nearly one-half million barrels of Universal Portland Cement to one railroad in a single year indicate the satisfaction which Universal gives the engineers of this road in their extensive and varied improvements, involving every type of plain and reinforced concrete construction.

Universal Portland Cement Co.
Chicago — Pittsburg

Annual Output 12,000,000 Barrels



"Cement Drain Tile" an investigation of their use and misuse in land drainage since the year 1871. This free, illustrated booklet is now ready for distribution. Address the nearest office of the Company.

Universal Portland Cement Co.
Chicago — Pittsburg

Annual Output 12,000,000 Barrels

Kansas City Show Not Well Attended

(Continued from page 28)

that 15,000 people had attended the show and that it was necessary to lock the doors to keep the eager crowd out of the building. This was faking, pure and simple, and did not a particle of good.

When a big circus goes on the road, it maintains an important department, whose duty it is to see to it that the territory traveled is one that is likely to spend its money for circuses. The Cement Products Exhibition Co. could help matters by taking a leaf out of the circus man's book in this regard.

The Kansas City show, taken as a whole, seems to indicate that comparatively few centers are big enough to support an exhibit of this kind with satisfaction to the management and to the exhibitors. The management must rely to a certain extent on the gate receipts as a source of income, and the exhibitors must naturally have an opportunity to display their goods to many interested people if they are to make satisfactory sales. It is safe to say that only a very few thousand dollars would cover the total purchases made at Kansas City, though the exhibits themselves were convincing and were arranged so as to give the best possible impression. It has been demonstrated that Chicago is a city in which cement shows may be given to advantage. Since the first exhibition at Tattersall's in January, 1907, Chicago has been in the center of cement show activity.

Three shows, except under unusual circumstances, are too many for a season. The expense to exhibitors, in shipping, installing, and maintaining an exhibit at three cities, makes it imperative that sales be made, in order to reimburse them for the outlay. Otherwise, the expenditures for the shows must be put down under the head of general publicity, which always costs more money than most exhibitors have to spend. One show at Chicago and possibly one other, at a point judiciously selected after careful investigation of all trade conditions, would do much to recover the enthusiasm of the exhibitors who make the big shows possible. As it is now, many of them flatly state that they have exhibited at their last show. How many of them will change their minds, after a good spring season in 1912, remains to be seen.

CONCRETE is for two shows—one in Chicago and one in some new territory, where it can be demonstrated that the show will be welcome.

English Trust Buys Mexican Cement Mill

A million-dollar deal was consummated March 28 in the offices of Frank Hagerman, attorney, Kansas City, Mo., between D. H. Gibbs, as a member of the Board of directors, representing the Associated Portland Manufacturers, the British cement trust, and F. S. Larabee, president of the Toltec Portland Cement Co., Toltec, Estado de Hidalgo, Mexico, by

which the Toltec cement plant became the property of the English trust.

The negotiations for the Toltec plant began when the engineer for the British cement trust visited the Toltec plant last fall. The associated manufacturers had a good market for their products, manufactured in the British northwest, until a company of Kansans went down and started a plant of their own, taking all the business away from the English trust.

The association sent its engineer to Toltec to figure on building a plant there. He visited the Kansas company's plant and President Larabee told him it would be a bad proposition to build another plant there, making a proposition for the purchase of the Toltec plant. The Toltec plant had been operated only seventeen months and paid \$190,000 on the investment of \$350,000 the first year of its operation.

The English engineer returned to London and put the proposition before the board of directors and negotiations were taken up by mail. Mr. Larabee left Stafford for London February 17. He met with the board of directors, talked the matter over with them, made them raise their offer \$100,000, and returned to Kansas a few weeks later with the contract of sale in his pocket. A few days later D. H. Gibbs, one of the board, arrived and the contracts were ratified March 28.

The Toltec plant cost the Kansans \$350,000 to install and put in operation. The sale price of the bare plant was \$800,000. Stock on hand and sundry equipment which the British company has contracted to buy will add \$150,000 to this, making a profit of \$600,000 on the investment of \$350,000 in seventeen months, outside of the 60 per cent profit on the first year's operation.

Specifications for Successful Concrete Paving

(Continued from page 35)

proper quality and consistency approved by the engineer. It shall be applied while heated to a temperature of about 400° Fahrenheit, and shall be so applied that said expansion joints shall be thoroughly filled clear to the top of the surface of said pavement.

All forms for expansion and contraction joints shall be made of iron or steel in the form of a template, out to the desired shape of the street according to the plans, and of sufficient strength to resist springing out of shape. All mortar and dirt shall be removed from forms that have been previously used. The forms shall be well staked to the established lines and grades.

CONTRACTION JOINTS.

Contraction joints shall be made entirely through the pavement every 12' 6" at right angles with the length of the street.

The edges of all expansion and contraction joints shall be rounded to a radius of about 1/2" with proper tools.

Care should be taken to obtain a surface free from ridges, at expansion or contraction joints, and depressions ridges, at expansion and contraction joints, and depressions or unevenness in the surface, that will detract from its appearance, or cause water to stand on the pavement. Any section having such inferior surface will be rejected and shall be rebuilt by the contractor at his own expense.

Care shall be taken to make the expansion joints in such a manner that they are practically the same width throughout their depth.

Extreme care must be exercised in removing templates or divisions used to make expansion or contraction joints;

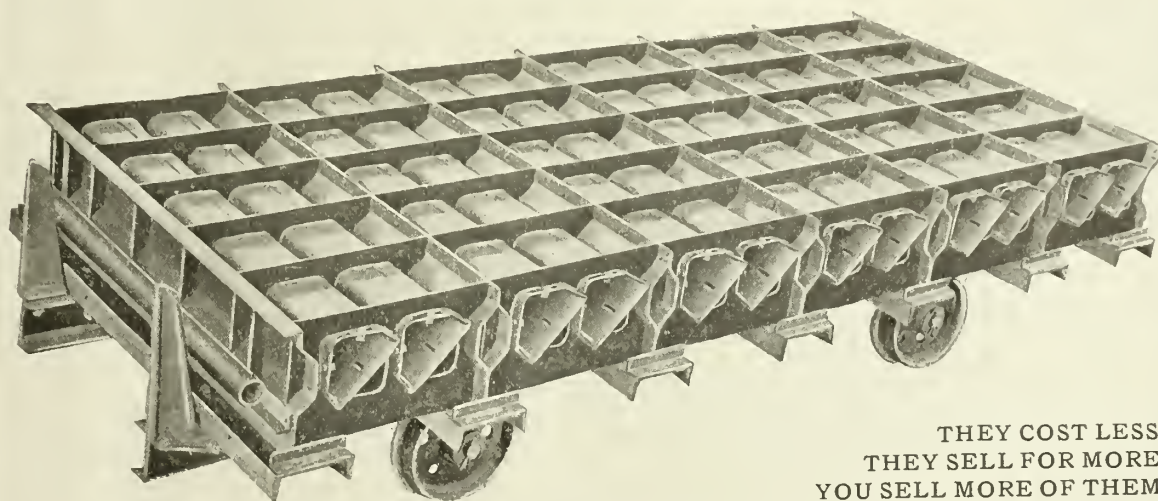
(Continued on page 82)

Zagelmeyer System

of Casting

Hollow Cement Building Blocks

The Zagelmeyer System uses a SLUSH CONCRETE for body of block and a patented process of applying the facing, which gives the block the most NATURAL STONE EFFECT of any block made. Blocks made by this system are GUARANTEED ABSOLUTELY WATER-PROOF, have THREE TIMES THE CRUSHING STRENGTH and are the handsomest blocks in the world. They sell for 25% more than the best dry tamp block and can be MADE CHEAPER than any other block on any other system.



THEY COST LESS
THEY SELL FOR MORE
YOU SELL MORE OF THEM

THE MOLDS IN THE ZAGELMEYER SYSTEM

are so PERFECTLY CONSTRUCTED that the faces of block are guaranteed not to vary the ONE-HUNDREDTH PART OF AN INCH IN SIZE. THE CORES pass through from one side of the car to the other; they are NON-TAPERING AND COLLAPSIBLE, and withdraw with perfect ease after cement has set. It is THOROUGHLY PROTECTED by PATENTS which enable us to give EXCLUSIVE TERRITORY. Secure your own city BEFORE SOMEONE ELSE DOES and get into a BUSINESS THAT PAYS. This is positively the best Cement proposition in the United States today.

MR. BLOCK MAKER.

Are you satisfied with your present system of block making? Are your customers satisfied with the blocks you sell them? Our system will satisfy both yourself and your customers. You will be satisfied because you can make the blocks for less money, can sell them for more and can sell more of them. Every customer is your friend and is boosting your business. Your customer will be satisfied because he will be getting a block so far superior to anything he ever saw that he simply can't kick and it makes him feel so good that he tells all his friends. A satisfied customer is the best advertisement you can get and our system certainly produces satisfied customers. Secure our system for your territory before your competitor does.

MR. CEMENT WORKER.

There is no branch of the concrete industry so profitable as making CAST CONCRETE BUILDING BLOCKS by our system. Their superior quality commands the respect of architects and builders and the LOW COST TO MANUFACTURE enables you to compete with all kinds of building material. There is practically no limit to the demand for such a cement block as our system produces, as architects readily specify them for all classes of buildings.

If you act quick enough you can secure the exclusive right to manufacture them in your locality, and you will then have a monopoly of the most profitable part of the concrete industry.

A postal brings our Catalog and Proof of our Assertions.

Zagelmeyer Cast Stone Block Machinery Co.

12 CRUMP AVENUE

BAY CITY, MICH.



Hollow Wall Silo Built at Amsterdam, N. Y.

Concrete Hollow Wall Silo

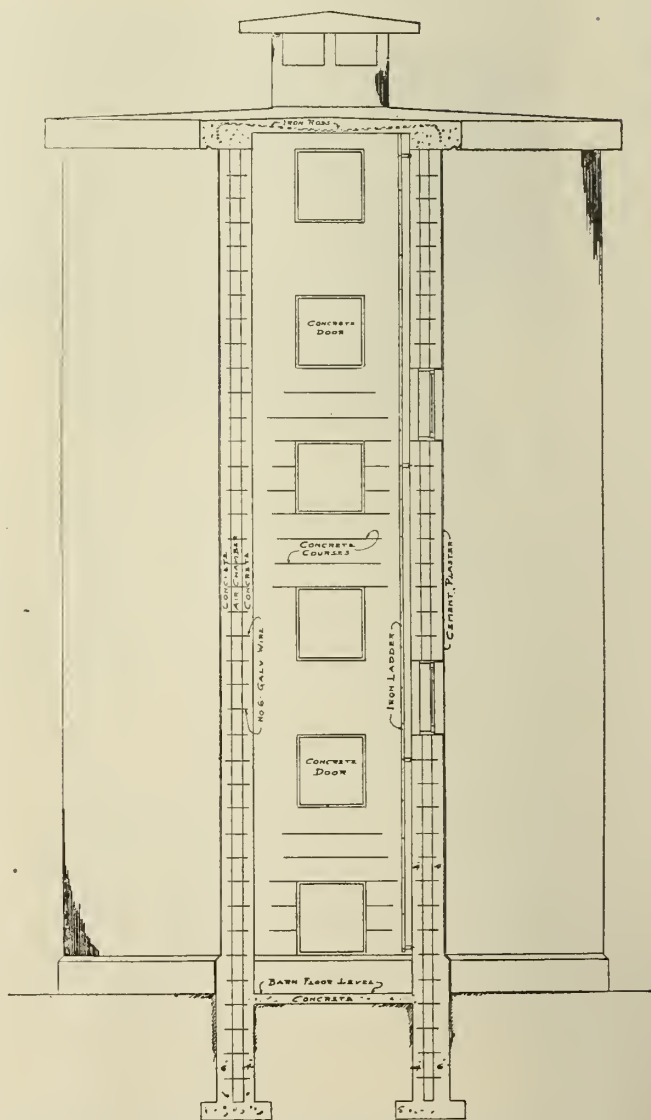
Concrete in almost every form has been used in the construction of silos. This is doubtless due to the comparatively low cost of concrete materials right on the ground and the splendid performance of such structures as have been given rigorous tests.

The silo shown here was built by Baird Bros. & Davey, Amsterdam, N. Y. We reproduce the ground plan, a side elevation and two sectional views of the wall. The wall consists of two independent 4" concrete walls with a 4" blanket air space between. The concrete was poured wet, the contractors using the system of the Van Guilder Hollow Wall Co., 728 Chamber of Commerce Bldg., Rochester, N. Y.

The two wall sections were tied together by No. 6 galvanized wire ties and the inner wall was reinforced by $\frac{1}{4}$ " steel hoops on 8" centers. The roof slab was reinforced by $\frac{1}{4}$ " steel rods radiating from a 2" iron ring in the top of the silo, to which they were hooked. The ends of these rods were about 3' apart at the silo wall.

The doors were made of concrete, reinforced with wire mesh. The door slabs were made 4" thick and were made far enough ahead to have them cured by the time they were needed for placing in the wall. They were supported by temporary studs while the concrete walls around them were being poured and were protected on their edges by tar paper to keep them from bonding to the wall and to provide clearance. Holes were molded in the doors and in the walls to receive expansion bolts for attaching hinges.

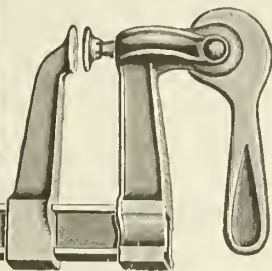
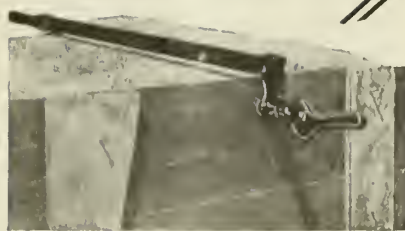
After the silo walls were up and the roof in place the interior was coated with a 1:2 sand-cement mortar and waterproofed with a sizing to prevent possible loss of brine. The exterior wall was plastered for ornamental purposes only.



ELEVATION & SECTION OF SILO

See plan and details on page 74

CLAMPS For Forms



No matter whether you are erecting forms for a reinforced concrete sky-scraper or are building concrete steps in wood molds in your plant, the easiest, quickest and cheapest method of securing the forms in place is to use Colt's clamps. Wiring takes time and results in shaky forms. Nailing is expensive and injures the lumber. Clamps hold the forms rigidly in place, are quickly removed and leave the centering available for future use.

Our clamps are made with long arms and short arms, with screw action and eccentric action. All are quick and positive.

Our clamp catalog describes their use and also illustrates wood clamps for carpenters, cabinet makers, etc. Write for a copy of Catalog No. 2980.

HAMMACHER, SCHLEMMER & CO.

Hardware, Tools and Supplies.

84th Avenue and 13th St.

New York, since 1848.

Grass Grows Under Your Feet Faster in the Cement Field

than in any other—if you don't stir around and read the latest news about new inventions and discoveries, told better nowhere else than in the monthly issues of

Cement Age

Engineers, Contractors, Builders, Architects

and any one else interested in concrete will find the very readable and authoritative articles in CEMENT AGE each month of actual value and assistance to them in their every-day work.

The Consultation and Correspondence Departments are conducted solely for the benefit of subscribers. If they don't find what they want to know among the articles, they write to our editors who gladly answer all questions. Sometimes the question is referred to a recognized authority on that particular subject securing the advantage of his special experience.

Better get in on this. The price is cheap—only \$1.50 per year (Canadian and Foreign 50 cents additional for postage).

May, 1911, Annual House Building Number FREE with a year's subscription for a limited time if you mention this offer.

A SAMPLE COPY FREE on request if you want to size up the magazine before sending in your order.

Address

Cement Age Company

30 Church St., Room 441,

NEW YORK CITY.

Peerless Concrete Moulds

for Monolithic Silos, Houses, Barns, etc.; the most simple, practical, complete on the market, and the Contractor's largest profit maker. We are Contractors as well as Manufacturers, and our experience, seven years, proves these statements.

SILO, or CIRCULAR Moulds built in standard size for diameters of 12', 14', 16' and up, or FLEXIBLE Moulds, each building three different diameters.

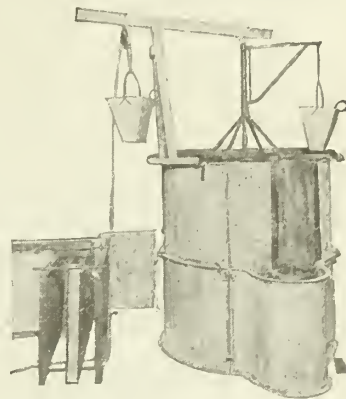
STRAIGHT WALL Moulds 24" deep, any desired lengths.

WE are the EXCLUSIVE owners of all U. S. Letters Patent, issued or applied for, on our moulds, and we caution all persons, firms or corporations from manufacturing, selling, using or purchasing them without our authority, or in any way contributing toward the infringement of our rights under said patents.

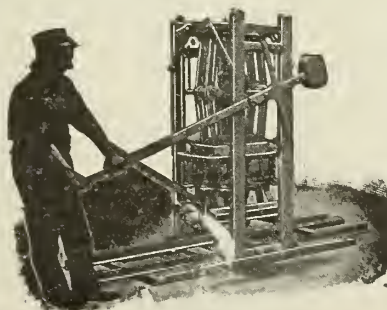
If you are in the market for concrete moulds, write US. If your Contractor does not use Peerless Moulds, let US build for you.

Live Agents or Organizers Wanted
in Every State.

New Enterprise Concrete Machinery Company
154 W. Randolph St., Chicago, Ill.



Somers Pressure Block Machine



This is a machine that molds concrete blocks under heavy pressure—the concrete is pressed into a block that defies competition. Somers blocks have passed the severest tests successfully.

WET MIXTURE

The only true concrete is made of coarse materials, mixed wet. Get a machine that will handle such a mixture without sticking. We have just issued a book that tells just how such blocks are made. Write us for a copy.

SOMERS BROTHERS

Box A, Urbana, Ill.

New Equipment, Methods and Materials

In this department the Editors endeavor to matter will be printed simply because an advertiser keep our subscribers informed upon new tools,ser desires it. Likewise, no matter will be excluded methods, machines and materials used in this indsimply because the article described is not adv ustry. It is in no sense a department for theertised in this paper. We aim to keep our readers benefit of advertisers. To secure attention the informed—suggestions for the improvement of this thing described must be new to our readers. No department are soiled.

New Molds for Concrete Vases

Molding concrete vases, jardinières and other ornamental work, "just as concrete blocks are made," is the aim of A. A. Houghton, Northville, Mich., who is manufacturing a new line of ornamental molds.

These molds are the result of many experiments to produce an ornamental mold that would work easily, rapidly and make a perfect cast. With the 12" to 16" sizes of these molds, the base, or stem, and the bowl, are molded separately, and fit together with a "lock" or a concrete mortise and tenon joint. The base and bowl molds are interchangeable, thus enabling the worker to make various combinations. Every part of the mold is within easy reach of the worker for tamping or "puddling" the concrete; the sections lock together rigidly and are so divided that they draw perfectly from the work. The automatic centering attachment on the core form makes it impossible for the worker to place the core at any point other than the exact center of the mold.

In manufacturing any design only one mold is required, as the mold is turned over upon a wood pallet and released from cast, leaving the work upon the pallet to cure. The core form is replaced with wet sand, which aids in curing the bowl.

Mr. Houghton states that the average molding time for each vase or jardinière is from 8 minutes for a 12" jardinière to 15 minutes for a large 20" lawn vase, employing only one mold and with each man mixing his own material.

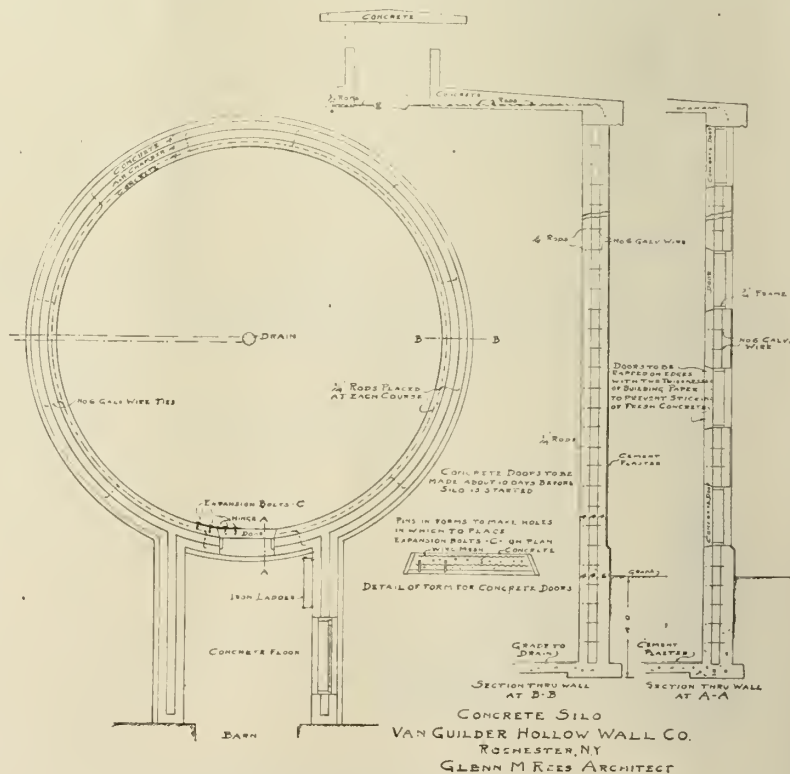
The Contractors' Supply & Equipment Co., Denver, Col., has lately reorganized, with H. E. Owen & Sons as officers. H. E. Owen is one of the oldest contractors in the field. The reorganized business has been put under the management of Chandler Owen, and the agencies of a number of well-known equipment houses have been secured.

Performance of Batch Mixer

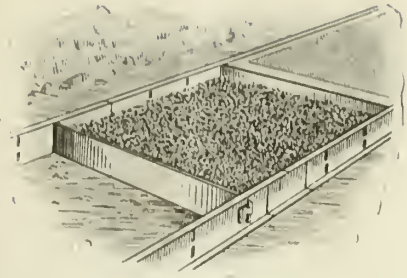
Huscha & Drake, contractors, who have just completed a High school building in Cannon Falls, Minn., write some interesting details about the performance of a comparatively new light-weight mixing machine, the Northfield, manufactured by the Northfield Iron Wks., Northfield, Minn. The contractors state that all the concrete, mortar and plaster used in the building were mixed in this machine, which is a light mixer of the batch type.

Three men mixed and placed the concrete for 6,500 sq. ft. basement floor in two 9-hour days. The cubic contents of the floors amount to over 60 yards. Material had to be wheeled into the building through hallways. The average hourly output of the machine was $3\frac{1}{2}$ cu. yds.

This mixer seems to be especially popular in the construction of educational institutions, as contractors who built the \$9,000 High school in Northfield used the machine and Contractor Albert Bjorass used one on the four-story concrete dormitory at St. Olaf College, Minn.



Plan and Sections of Amsterdam Silo. (See page 72)



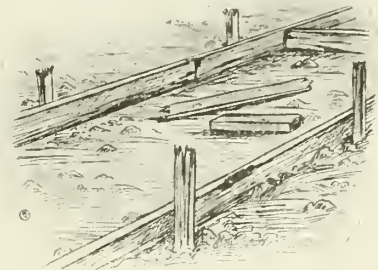
Berger's Pressed Steel Forms

are durable, easy to handle, clean, no time lost in cutting and driving stakes nor truing forms. No waste of expensive lumber, no debris to be cleaned up when work is completed.

Which
for
Concrete Sidewalk, Gutter and Curbing Construction?

Wood Forms

require time to cut and assemble — never ready. Are practically useless afterwards.



are being used by the leading contractors — write for prices today.

THE BERGER MFG. CO., Canton, Ohio.

New York
St. Louis

Philadelphia
San Francisco

Minneapolis
Atlanta

Boston



CONTINUOUS MIXER, cheapest and best. Write for prices and description. A fine machine.

Adjustable Block Machine No. 4

All blocks Face Down, having Lever Drawn Cores. Cores being Oval makes tamping easy. Makes all Standard size blocks, having many designs of faces. A machine for rapid work. A great machine for little money.



Special Machine for This Kind of Work

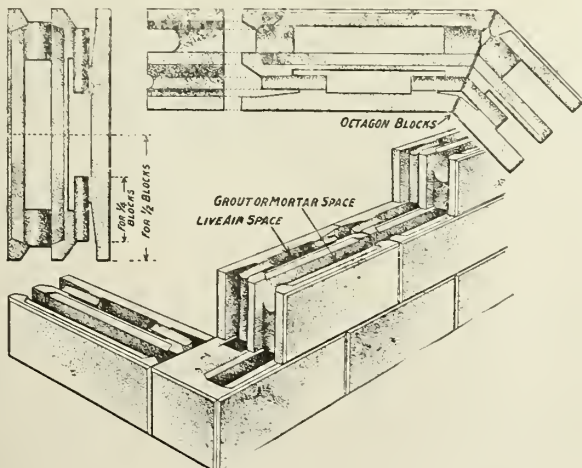
Not an Experiment, but the Best Thing Ever.

A NEW PROCESS of making Cement Blocks, called "Cement Block Forms." Blocks laid up DRY, having two compartments, inside with a ZIGZAG Air Space, outside to be filled with a coarse slush grout and lime mortar. Every joint sealed. An absolute DRY WALL. Closest of joints; no mortar-daubed blocks; much quicker laid, and a far better wall is the result.

All kinds of Concrete Machinery, such as Brick, Tile, Chimney, Cap and Sill Block Machines and Mixers.

J. C. Miller Block Machine Co.

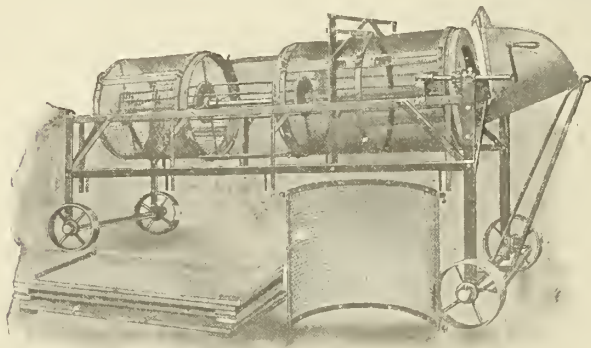
JACKSON, MICH., - - - Foot of Clark St. and M. C. R. R.



Screening Sand, Gravel and Stone

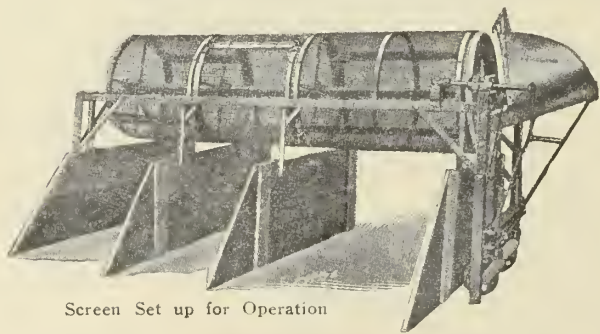
The theory is rapidly gaining ground that a concrete contractor can save cement and at the same time build his structures of better concrete—concrete that is more nearly waterproof and certainly of greater crushing strength—if he will use care in seeing that his aggregates are properly graded in size. Working out this theory has created a demand for screening devices and this demand is being met by F. S. Converse, 101 Chestnut St., Binghams-ton, N. Y., with a special screen which seems to have many valuable features.

This screening equipment consists of a skeleton cylinder frame of steel, to which are attached sec-



Screen Ready for Assembling

tional screens of varying size of mesh. Each screen section is divided in halves for ease in assembling. By experiment the operator may determine just how coarse he wants his screens to run and the proper mesh is furnished him. A complete screen generally comprises sections having four different sizes of mesh and producing five different sizes of



Screen Set up for Operation

material—the material which passes through the four sections and the balance which is rejected by all.

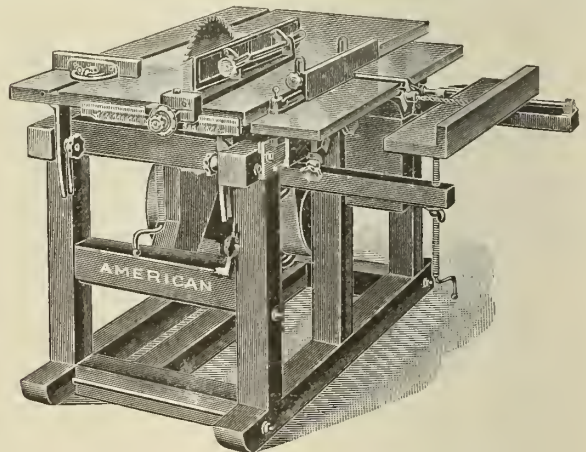
The complete screen is mounted on wheels, which may be removed. The material is fed into a hopper at the upper end and the different sizes of screened material are kept separate in temporary wooden bins arranged under the cylinder. The first, or finest, section of screen is kept constantly agitated by an automatic hammer which jars the wire mesh and prevents material from clogging. The screen

cylinder may be operated by a hand crank or this may be removed and pulley substituted for the application of power. When it is considered that the ordinary hand method of screening material produces only one size, the advantage of producing four or five sizes at one operation is apparent.

Portable Wood Worker For Contractors

Some time ago, the American Saw Mill Machinery Co., 84 Main St., Hackettstown, N. J., put on the market a contractors' portable saw bench which has had a large sale. Recently the company has developed its original idea and has evolved a piece of machinery that combines in one the functions of a number of different machines, with the advantage that it can be transported from one job to another. It is equipped with self-contained motive power and is ready for business as soon as it is set up. In its versatility it suggests the Yankee jack-knife with twenty-six blades. Three men can work at it at the same time, performing three distinct kinds of work. For example, one may operate the rip-saw, cut-off saw, mitre saw or dado heads, on the table, while another uses the jointer or the planer and a third uses the same machine for boring.

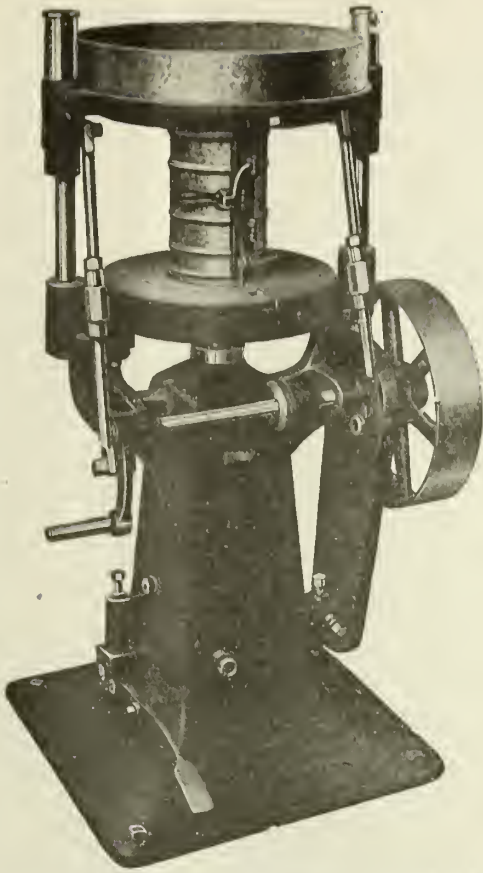
The top, or table, of the machine is made of carefully planed cast-iron, hinged in the rear, raised or lowered by a hand-screw and clamped in any desired position. The supporting frame is of hard-



New Type of Woodworker

wood, framed and bolted. The adjustable ripping gauge opens out 14" from the saw and has a tilting fence for bevel sawing, with a positive lock, permitting any angle. The cut-off gauge slides in a groove and is adjustable to cut squares, mitres or any angle. The regular rip and cut-off saws furnished are 12" in diameter, but 14" saws may be used. Two dado heads, 1/2" and 7/8", are also furnished.

The jointer or planer is entirely independent of the top, being separately supported on the frame. Its tables are 7 1/2" wide, with a combined length of 43", and are adjustable to any position. At one side



¶ Why the manufacture of cement drain tile is profitable and why you should buy a Dunn Drain Tile Machine

The Drain Tile Business in a Nutshell

The increasing value of farm land makes it necessary to utilize every possible plot of ground. Wet lands never tilled before are now being planted to crops.

These lands require drainage. Farmers in every section are interested in tile drainage.

Cement drain tile are superior to every other drainage agent. They are not only better, they are cheaper. The big fight made on cement tile by the clay tile interests a few years ago simply proves the value of cement tile. The

clay tile people lost. They couldn't compete in quality or price with cement tile.

Cement tile, even in clay tile communities, may be made and sold at a handsome profit, regardless of competition. Find out what clay tile are selling for in your town; then let us show you how to figure the cost of cement tile and you'll see the point. Right in your community, a cement drain tile plant will pay. Operate a straight tile plant or simply make drain tile as a side line to your regular block or brick business.

17 Reasons for Choosing a Dunn Cement Drain Tile Machine

Among many other exclusive advantages, the Dunn Drain Tile Machine possesses the following:

1. Simple construction—all working parts concealed in dustproof base.
2. Right height for a man to work at—no stooping.
3. Packer shoes adjustable to pack cement as hard as desired.
4. Makes more tile per day per man than any other machine.
5. Packer returns twice as fast as it runs up, in packing tile.
6. Tile are given double packing, on up and down trips of packer.
7. Packer shoes and steel pallet rings take all the wear and are cheaply replaced.
8. Packs tile extra hard at the bottom, making it easily released from casing.

9. Packer always at the bottom ready to start making tile on its up trip—no lost motion.
10. Requires no special base—its own base is solid.
11. Requires no high ceiling—there is no overhead rigging.
12. May be moved from place to place on a truck.
13. No expert machinist required to set it up or to keep it in repair.
14. Speed may be controlled absolutely by the operator.
15. It never stops running from morning till night—no jerks, no jars.
15. Operates automatically—touch the lever with your foot and the machine makes a tile.
17. Sold at a low price, because we employ no agents, no traveling men, and we don't have to send a mechanic to set the machine up.

Send today for our special Tile Machine Folder.

W. E. Dunn Manufacturing Co. 4134 Fillmore St. **Chicago, Ill.**

**15 Day
Free Trial**

Don't take our word for this—if you want a tile machine, order a Dunn on trial. We'll ship you a machine at once. Set it up in your plant. Use it. **ABUSE** it. If it doesn't make good, ship it back. If this machine were not all we claim for it, we couldn't afford to make this liberal offer. The price is \$175.00.

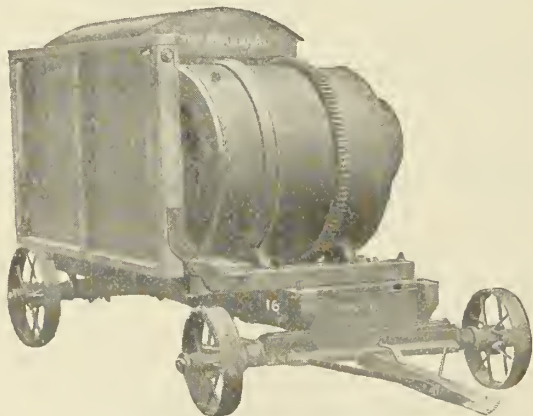
\$175

is an adjustable fence, tilting to any bevel for work like chamfering. The jointer has a steel cutter head with two 6" knives, and a sander drum may be substituted for the latter, when desired. Outside of the jointer is a boring table, with a travel of 6" in line with the spindle and an up-and-down adjustment of 3½".

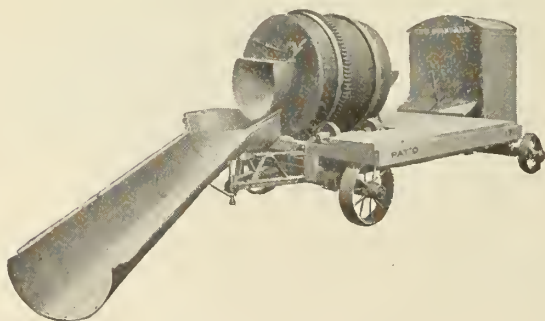
Either gasoline engine or electric motor is furnished with the machine, built in, and there is a full complement of tools. Its capacity with standard engine or motor is 75 to 125 linear feet of 1¼" lumber per minute, or 30 to 60 feet of 2" lumber. It rips 3" lumber and heavier stock may be worked if fed slowly.

Special Mixer Attachments

The manufacturers of "Standard" (formerly "Eclipse") low-charging concrete mixer, in addition to the regular outfits formerly furnished, are prepared to supply the contracting trade with several novel designs and modifications. One of the designs shown here is provided with a folding platform, which is raised up in front of the mixer drum and fastened with a hook when it is desired to move



"Standard" Mixer with Folding Platform



With Conveyor Spout

or ship the machine. It may be quickly dropped down in mixing position, thus making a wide platform ready for immediate use, for instance, on narrow streets or beside car tracks. The folding platform may be lifted to allow vehicles or cars to pass.

The other illustration shows mixer with charging trough for placing the mixed concrete by gravity,

directly from the machine to the paving or other work.

Another design, not illustrated, has a cart-charging arrangement, whereby the entire batch charge is transported from the material piles to the mixer platform, in a two-wheel hand cart, guided by one man and pulled by a rope running to a hoist which is operated by the engine on the mixer.

This arrangement will enable one man to bring all the material from the piles to the mixer even if the distance is fifty feet or more. Several carts are used so that there are always some to be filled while the mixer is being charged. The results obtained by this method have been very gratifying, as rapid work can be accomplished with a small force of men. The Standard Scale & Supply Co. manufactures this mixer.

New Batch Mixer

W. L. Keller, Kearney, Neb., has built a new type of batch mixer to meet a demand for a low price machine of quality. The first machine built is shown here. The mixing operation consists in cutting and doubling the contents of the drum by rotating the cylinder. Inside the drum are four sta-



Mixer of Three-Barrow Capacity

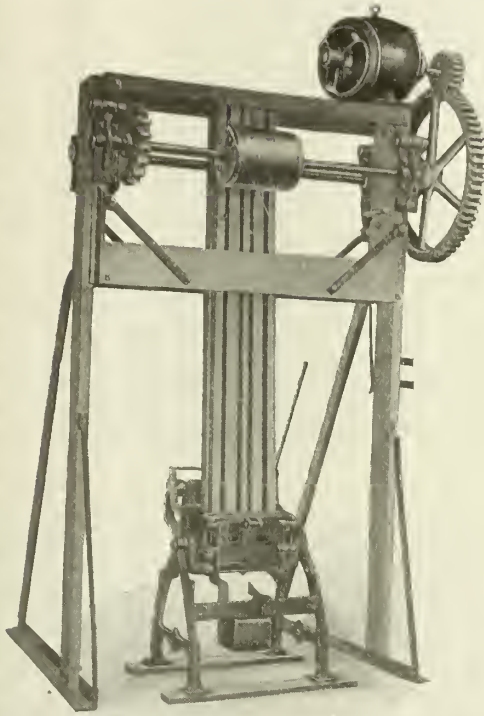
tionary spiral blades, set one inch from the inside surface of the drum. Two of these blades are "right" and two "left," and the material is thrown from one end of the drum to the other.

The mixer will hold three barrows of material and Mr. Keller asserts that six revolutions of the drum will produce a uniform mix. The mixer may be loaded to be run by hand power or a 1½ H.P. engine may be attached.

"Tanex" Glass for Sidewalk Lights.

Owing to the severe variations in temperature to which it is subjected in use, considerable difficulty has been experienced in manufacturing glass entirely suitable for sidewalk lights. The Berger Mfg. Co., Canton, O., announces a new type of glass, marketed under the name of "Tanex," which is especially made for sidewalk light and vault

Let a Little Motor Run It



Besser Automatic Tamper Operated by Sterling Motor.

No matter what kind of machinery you have to operate, you can save time, money and a world of bother, by attaching a Sterling Electric Motor to it. We'll tell you why.

If you have a mixer or a hoist or a saw table out on the job, you can bolt a motor to a plank, connect her up, turn on the juice and she'll hum all day. No costly delays. No running out of fuel. No man needed to watch it work. You avoid all those difficulties, and your power cost is lower.

If you have a concrete plant, rig up a central motor and let it feed power to the different machines, or attach a baby motor direct to each power-driven machine, saving overhead belts and shafts. You'll find that a Sterling motor will do your work better, faster, cheaper and with less annoyance than any other power unit.

Tell us what machines you have to run, what horse power each requires, what your plant lay-out is and whether the electric current available is "direct" or "alternating," and we'll show you how to cut your power costs and save gray hairs.

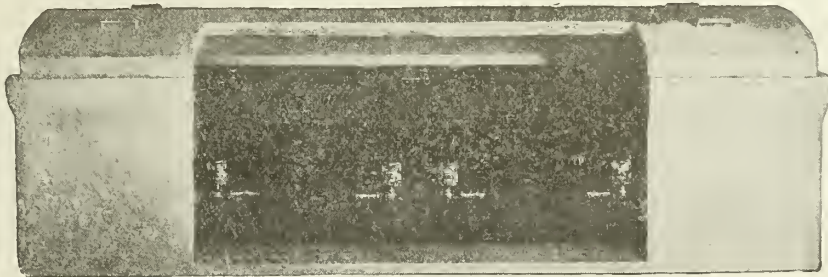
The Ohio Sterling Company

Manufacturers of electric motors for concrete machinery.

DAYTON, OHIO

GO ASK YOUR UNDERTAKER

QUALITY



APPEARANCE

Consult him about a Concrete Burial Vault and you will find the "National" comes up to his every expectation. It is the undertaker you have to please, so why not get

THE NATIONAL STEEL MOLDS

that make "the vault without fault?" This is the only vault on the market with a successful visible sealing process. This sealing process practically makes it a solid, one-piece vault. The National Burial Vault is everlasting, is air-tight, and water, vermin and ghoul proof. Made in artistic style, shape and finish. The only steel body-mold on the market that will not spring or spread when cement is poured into it, thus making the lid and body of the vault fit each other perfectly when finished. Thirty thousand sold in three years. More National Molds and Vaults in use than all other makes combined. Can refer prospective buyers to hundreds of successful manufacturers of vaults.

LIGHTEST VAULT AND LEAST EXPENSIVE TO MANUFACTURE AND HANDLE

Requires: 3 sacks cement, 600 lbs. sand, 19 lbs. expanded metal, 4½ lbs. waterproofing, 1½ lbs. paint and handles. Total 971 lbs. Wet process.

MOLDS AND TERRITORIAL RIGHTS FOR SALE IN THE U. S. AND PROVINCES OF BRITISH COLUMBIA, ALBERTA, MANITOBA, AND ASSINIBOIA IN THE DOMINION OF CANADA. Write Today

NORWALK VAULT COMPANY, NORWALK, O., U.S.A.

In writing Advertisers please mention CONCRETE.

light construction. It is called a "new process" glass and is said to be the result of exhaustive experiment, covering a number of years. The company uses this type of glass in all its vault and sidewalk light construction.

New Bag Tying Device

Our readers are already familiar with the progress made in the design of machines for tying cement, lime and plaster bags automatically. A new tying device recently placed on the market by a Toledo firm is shown here. With the wire tie around the neck of the bag as shown in Fig. 1, it is simply a matter of fastening the tie to the tool and pulling



Adjusting the Bag Tyer

the sleeve of the tyer over the spiral shank, twisting the wire tight (Fig. 2).

The same method is followed in tying reinforcing rods in place on the job. The tool and the wire ties are manufactured by the United Wire Tie Co., Dept. E, 1341 Nicholas Bldg., Toledo, O. The company's plant has a capacity of half a million ties per day.



Wire Tie Twisted Tight

The company also produces a machine into which wire is fed from a reel and which ties bags at the rate of thirty per minute, a boy operating it.

The Zagelmeyer Cast Stone Block Machinery Co., Bay City, Mich., manufacturer of molds for casting concrete building block, announces that a modern concrete block factory is to be built in Detroit, Mich., and will be in charge of Alex. Zagelmeyer. The new plant will embody several modern features not to be found in any other concrete plant in the country.

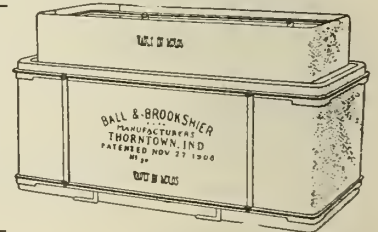
The Leavitt Mfg. Co., Urbana, Ill., manufacturer of "Cardiff" drain tile machines, will double the capacity of its plant this spring by building a brick addition, with reinforced concrete floors.

THE HOOSIER CEMENT BURIAL VAULT MOLDS

All steel, no wood. Telescopes and adjusts for making twenty sizes of sinks, tanks, bath tubs or vaults. Makes vaults with circle corners, preventing cracks. Corner strongest portion of walls.

Ask for circulars Nos. 5 and 6 Agents wanted in every State.

BALL & BROOKSHIRE
Thorntown, Indiana



Cut Your Own Reinforcing Bars on the Job with an

Eagle Bar Cutter

Open knives—adjustable stroke. Operated by any laborer. Will pay for itself. Made of Steel Plates and Forgings. Fully Guaranteed.

HAND POWER
BEAM—RATCHET—LEVER
PUNCHES

WIENER
MACHINERY CO.

DEY AND CHURCH STS. - - - NEW YORK CITY



Two Sizes
 $\frac{3}{4}$ " and $1\frac{1}{4}$ " Bars

White Sparkling

Crushed Granite

Graded in several sizes for concrete work. This is the best material for facing artificial stone, monolithic concrete work, stucco, floors, sidewalks, etc.

Concrete made with this material is strong, dense, moisture-repelling and has the appearance of natural granite, molded to any form. Send for complete information and sample.

Monarch Mining Co. 120 Culver Ave., Jersey City, N. J.

SEND FOR FREE SAMPLE

Every reader of this paper should have a sample of this material. It will be sent free to any address. Write today.

Concrete Culverts in Iowa

The steady progress of the good roads movement is having a beneficial effect upon public drainage policies. In many districts where wood culverts used to prevail, culverts of more dependable and lasting material are being demanded by taxpayers themselves. The only materials considered by highway officials no ware concrete and corrugated iron. The high cost and comparatively short life of the latter material is always a heavy argument against its use.

Kansas has hundreds of concrete culverts and small bridges and Iowa is following the same policy of installing permanent crossings for small streams.

J. R. Neil, chairman of the board of supervisors of Cherokee county, Iowa, has engineered the construction of several culverts and bridges of concrete. In one case a wooden bridge over a small ravine was constantly in need of repair. It became a regular candidate for appropriations and was never safe.



Culvert Form Ready for Removal

Bids on a concrete arch bridge were secured and the estimated cost was \$350. The board finally built a culvert to take care of the water in the stream. The culvert is 60' long and 4' in diameter. Retaining walls are 17' long and 12" thick. The material for the structure cost \$121.25 and the labor \$78.75—total, \$200.

Eleven townships in Lee county, Iowa, are building concrete culverts similar to the one shown here. Merrillat forms are used. The first culvert built, last year, is 20' long and 42" in diameter. Wing walls are 20' long, 8' high and 10" thick. The culvert cost \$112.10 complete. A metal culvert would have cost the county \$160, f. o. b. Warren, Ia., and wing walls would have to be built in addition.

Both of these counties use Merrillat core forms for building culverts and small bridges. This form consists of an expansible cylinder which forms the core of the concrete culvert. By turning a wheel it may be adjusted from 20" to 4' in diameter. Thus one form serves for building any size culvert that is ordinarily required. The Merrillat Culvert Core Co., Oak and Railroad Sts., Winfield, Ia., maintains a staff of culvert and bridge experts who work in conjunction with local highway officials in improving public roads.

Let the HELM DRY WALL Building System Build You a Profitable Trade

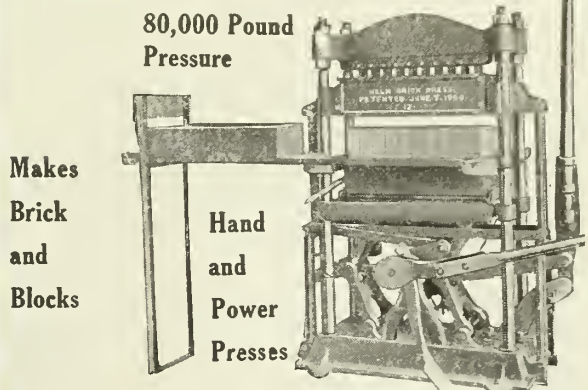
It will do it for you because it has done it for others. You cannot afford not to investigate this system. No matter if you are new to the business or most firmly established, here is an opportunity that you should know all about. This system makes **DURABLE** and **SUBSTANTIAL** walls which are **FIRE-PROOF** because no furring and lathing are used to create a fire runway, and **ABSOLUTELY FROSTPROOF** and **WATER-PROOF** because the continuous air space totally separates the interior surface from the exterior.

By this System HELM DRY WALL Two-Piece Blocks and Pressed Brick are Used Separately or in Combination.

These are the **BEST SELLING** products because of the **ADVANTAGES** they give the user in **ADAPTABILITY, STRENGTH, QUALITY** and **APPEARANCE**. The **DRY WALL** feature overcomes the objections to other concrete products and **PRESSED** brick always have the advantage over common brick and other kinds.

Helm Combination Brick and Block Presses Successfully Produce These Two Products.

Only one of these **RAPID OPERATING** machines needed to equip a plant. The **80,000 POUNDS PRESSURE** assures a dense, uniform product. The **FACE UP** principle admits use of medium wet materials and saves facing material over any other method. The automatic features and use of pressure save labor.



Helm Presses are Built in Two Sizes. Changeable from Hand to Power Operations at any Time. Interchangeable for Blocks and Brick.

The hand machine can be converted into a power machine at any time and increase the capacity 50 per cent. Machines for 500 blocks or 5,000 brick daily—1,000 blocks or 10,000 brick daily—1,500 blocks or 15,000 brick daily. Let our **FREE** book inform you about this **DRY WALL** system and the improved Helm presses.

If you own a plant and want to increase your profit, or if you think of starting one send for our **HANDBOOK** on concrete. Just a few copies left to be mailed free.

Send for both books, today.

Send the Coupon Now.

Queen City Brick Machine Co.
444 BANK BUILDING
Traverse City, Mich.

Queen City Brick Machine Co.
444 Bank Building
Traverse City, Mich.

Please send the free literature advertised in Concrete

Name.....

Address.....

Specifications for Successful Concrete Paving

(Continued from page 70)

the breaking out of any portion of the pavement in removing such templates and forms will not be tolerated, and such damaged portions of the work shall be torn out and replaced in good condition by the contractor at his own expense.

The contractor shall keep pavement sprinkled for one week after it is laid, or longer if deemed necessary by the engineer.

The contractor shall keep the streets barricaded where pavement has been laid for at least two weeks after the completion of the same.

The above specification was followed very closely in every detail.

In this work 30,000 barrels of Mason City Portland cement were used. From every car ten samples were taken, tests were made for fineness, tensile strength and specific gravity; boiling tests were also made.

In the construction of this work a Koehring* mechanical batch mixer with a 25' boom, with a traveler, was used.

After the sub-grade had been thoroughly rolled, the material was distributed along the street, the rock on one side and the sand on the other. The mechanical mixer was set up at the end of the street 25' from the place of beginning. In the first section 12' 6"x30' the concrete was placed. Immediately the wearing surface was placed upon the concrete, not to exceed twenty minutes elapsing between the time the concrete was placed and the wearing surface was put on. Then the next section of 12' 6"x30' was put in. Then the mixer propelled itself backwards 25' and proceeded as before.

Parallel with the curb and 10' out from the same the wearing surface was cut through into the concrete, these parallel cuts being 10' apart so that our actual blocks of concrete are only 12' 6"x10'.

Some of the streets where the concrete paving was laid were very soft and swampy. To obtain a dry and well drained sub-grade, a trench parallel with the curb and 18" out from the curb and 18" below sub-grade was excavated on each side of the street, and a 4" drain tile laid in the trenches and the tile connected with the sewers. The earth excavated

from these trenches was hauled away and the trenches were refilled with good, clean, hard, burned cinders, making a thorough drainage for the sub-grade. The contract price for these concrete pavements, including excavations, was \$1.32 per square yard.

The cost to property owners was five cents a square yard in addition to the contract price, which includes the cost of engineering, inspection, advertising and levying the assessment, making a total cost of \$1.37 per square yard to the lot owners abutting on the pavement.

I am changing my specifications for the work that is to be constructed this coming season, calling for my expansion joints to be placed 37' 6" apart, at right angles to the curb, instead of 25' apart. I am also requiring a softened steel reinforcing plate, 1/4" in thickness and 2" in depth, to be anchored back into the wearing surface; these steel plates to be used on each side of the expansion joint to protect the edges of the pavement at that point. The reason for using these expansion protection plates is that the weakest point of a concrete pavement is at the expansion joint.

The Chicago Portland Cement Co. announces the death of David D. Drummond, vice president and manager of the company. His death occurred Friday, March 8, at the Drummond home, Oglesby, Ill.

An investigation in regard to the corrosion of iron and steel in cinder concrete is being made by the Aberthaw Construction Co., concrete engineers and contractors, Boston, Mass. The company will be pleased to hear from anyone who has had practical experience or possesses information on this subject.

In conjunction with the textile exhibition to be held in the Mechanics building, Boston, Mass., April 22-27, there will be a section devoted to cement and concrete.

F. E. Guy has been appointed assistant eastern traffic manager of the Universal Portland Cement Co. His office is in the Frick Bldg., Pittsburg.

*Koehring Machine Co., Milwaukee, Wis.

SAMSON SPOT SASH CORD



Made of extra quality stock, carefully inspected, and guaranteed free from all imperfections of braid or finish. Proved by both tests and long experience to outwear common cord or metallic devices many times over. Can be distinguished at a glance by our trademark, the Spots on the Cord. Send for catalogue and samples.

Trade Mark Reg. U. S. Pat. Off.

Samson Cordage Works, Boston, Mass.

STRONG COLORS FOR CEMENT

Red, Black, Buff, Green, Blue, etc.

C. J. OSBORN COMPANY 268 Water St.
New York, U.S.A.

Have you a man in your plant who can strike a block 600 blows per minute?

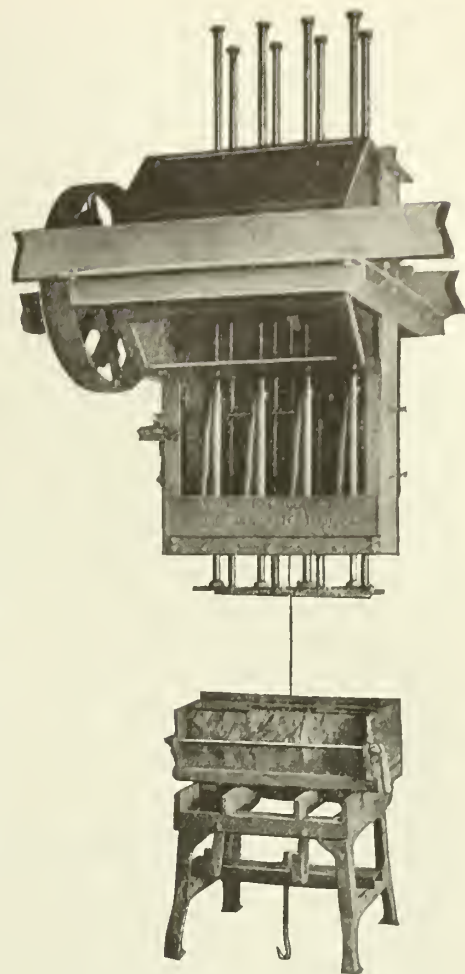
Have you a man in your plant who works just as hard and just as faithfully at 4 P. M. as he started in the morning? What you need is an---

Anchor Automatic Tamper

This tamper requires no floor space---it is suspended over your machine. It will fit any block machine. It requires one horse power only. The eight tampers work in a dust-proof case; each tamper strikes 75 blows per minute, 600 pounds to the blow. The block is finished when the mold boxes are filled. Instal this machine; increase your output; cut your cost.

Anchor Concrete Block Machine

On this machine you can make block for two-piece wall construction that will defy competition. Anchor blocks are tied together with metal ties. They make an absolutely dry wall. Equipped with circle-mold the Anchor machine will turn out Silo blocks that will meet instant sale.



Tamper disengaged, with cover in place

Get Our Catalog and Prices

Anchor Concrete Stone Co.
Rock Rapids, Iowa

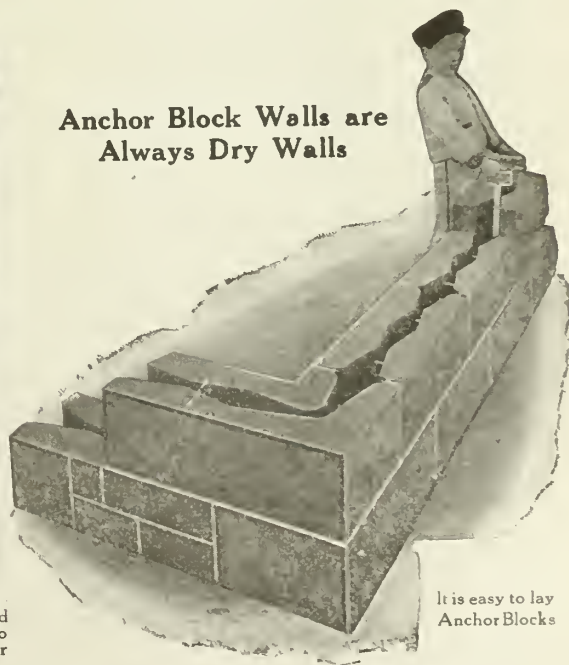


How Anchor Circle block lay up in a silo wall. Note complete blanket of air in the wall. Also groove in block to receive reinforcing.



Anchor Continuous Air Space Silo build by John Olsen, Rock Rapids, Ia. This Silo is 16 ft. in diameter by 36 ft. in height; four foot of the height being underground.

**Anchor Block Walls are
Always Dry Walls**



It is easy to lay
Anchor Blocks

Catalogs Received and on File.

A neat folder describing its product and its many uses has been issued by the Ottawa Silica Co., Ottawa, Ill.

Plymouth Plaster Board for covering walls is mentioned several times in a folder issued by the Plymouth Plaster Co., Fort Dodge, Ia.

Furnace slags and their uses in concrete work form the text of a neat and comprehensive catalog issued by the Carnegie Steel Co., Pittsburg, Pa. The reading matter includes a number of tables of tests made on slag concrete and these are of very considerable interest.

"Concrete Facts," concerning "Minwax," manufactured by the Minwax Products Co., Monadnock Blk., Chicago, Ill., is the title of a booklet issued by the company. It is an interesting little book, and has something to say about Minwax as a waterproofer and finisher. But William B. Hough will get you if you don't watch out, Mr. Minwax. He has a copyright on that title, "Concrete Facts." We know what we are talking about.

Franklin R. Muller & Company, Chicago, issue an attractive catalog of their product, "Asbestone," which, as most of us know, is an artificial flooring. Its manufacturers are quite enthusiastic about it and make out a good case for its merits.

Triangle mesh reinforcement and a convincing array of statements and tables to show why it is a mighty good reinforcing for concrete go to make up the reading matter in a catalog issued by the American Steel Wire Co., Chicago, Ill., and everywhere else. The concrete man will find much worth keeping in this booklet, which is small in size, but big in information.

Dayton "Inserts," for attaching pipes, machinery, shaft hangers and so on to concrete construction are described and illustrated in the catalog of the Dayton Malleable Iron Co., Dayton, O. A convincing illustration is one of a $\frac{3}{4}$ " bolt supporting a dead load of 6400 lbs. This is certainly remarkable as the result of a single insertion.

A handsome catalog, with enameled and embossed printing, is issued by the Corrugated Bar Co., St. Louis, Mo., to describe corrugated bars for reinforced concrete. These bars are among the best known of the deformed bars and have been used in important construction, some of which is illustrated in this late catalog.

The February, 1912, number of "Detroit-Fenestra," published by the Detroit Steel Products Co., Detroit, Mich., carries several attractive illustrations and some text on the subject of all-steel and glass window work.

From conveyor to finished product, along the literary lines of "The House that Jack Built," is the most recent folder issued by the Jaeger Machine Co., Columbus, Ohio. The text begins: "This is the machine that makes the stone to use." Then: "This is the mixer that mixes the material for the machine that makes the stone to use"—and so on. It drives home the main idea very cleverly.

Crushed stone and how to get it are the topics covered in an originally designed folder printed for the Eureka Stone & Ore Crusher Co., Cedar Rapids, Ia. The company makes the "Mitchell" improved crusher and knows all about it.

Illustrations that show the adaptability of the device and text that describe its operation are combined in a new catalog issued by the Flom Concrete Form Co., Inc., Madison, Wis. The firm manufactures adjustable and collapsible concrete forms for use in the construction of culverts, bridges, silos, sewers, foundations and cisterns.

A new type of floor, laid by the use of the "Atlas" sanitary composition flooring, is described in a miniature catalog issued by the Atlas Floor Co., Old Colony Bldg., Chicago, Ill.

Marbleized fibre, a product manufactured and marketed by the Marbleized Fibre Co., Cincinnati, O., is described and illustrated in attractive color in a good-looking catalog just issued by the company.

"Wall Builders," in the shape of forms for erecting monolithic concrete walls of several types, are the product of the New Enterprise Concrete Machinery Co., Chicago, Ill. Their nature and use are described in the company's latest catalog.

The Crown Point Spar Co., quarriers of granite crystals for use in surfacing concrete, describe their product in a small catalog. The New York offices of the company are at 663 Broadway, N. Y. C.

Time-saving, labor-saving, back-saving concrete tools—the long-handled variety—are shown in every conceivable position by the Concrete Supply Co., Arrowsmith, Ill., in a folder that is being sent out by that firm.

Two catalogs, one entitled "Waterproofing" and the other "Ironite," have been published by the publicity department of the Ironite Co., Chicago, Ill. There are some good hints on methods of waterproofing in the latter.

John L. Taylor, who makes portable steel derricks, has had a catalog printed describing his various types of hoisting apparatus, distributing the printed matter from 1034-1036 W. Lake St., Chicago, Ill.

Several attractive catalogs, small in size, but full of information, are published by the Troy Wagon Works Co., Troy, Ohio. They deal with the advantages of Troy wagons and wagon-boxes.

Contractors' equipment and pumping machinery of the "Novo" make are listed, illustrated and talked of in a catalog published by the Novo Engine Co., Lansing, Mich.

Henry Pels & Co., 90 West St., New York City, issue a small illustrated folder, setting forth the features of numerous types of bar-cutters manufactured by the firm.

"Reliance" and "Sea Lion" belting, made by the Chicago Belting Co., 12-22 S. Green St., Chicago, Ill., are featured in a folder recently published by that company.

Shovels for every purpose under the sun are made by the Conneaut Shovel Co., Conneaut, O., and a number of special makes are listed in a colored folder that is being distributed by the company.

A 40-page catalog, describing Scandinavia belting, its manufacture, use and advantages, has been issued by the Scandinavia Belting Co., 127-129 White St., New York City.

A long experience in handling sheet metal in the manufacture of boilers qualified the W. B. Jones Boiler Co., Streator, Ill., to go into the manufacture of steel forms of the Heltzel system. The firm makes sidewalk, curb, and curb and gutter forms, collapsible tank forms and steel batch boxes, besides concrete finishing tools, curb and gutter templates, and so on. The construction forms are illustrated and described in a red-bound catalog published by the company.

A small folder, but one that is complete because of the well chosen illustrations, is issued by the United Wire Tie Co., Toledo, Ohio. The tie manufactured by the company is being used in the cement, plaster, lime and retarder trades to secure the necks of bags.

Conveying and depositing concrete by gravity are depicted in a modest folder issued by the Concrete Conveyor Mfg. Co., Masonic Temple, Cedar Rapids, Ia. An illustration shows the system in operation, spouting the concrete a distance of 360'.

We are the sole agents in United States, Canada and Mexico for

Meyers's German Cement and Liquid

For Patching All Kinds of Cement Work

We have a large stock on hand. Prices as follows:

1 Kilo Can	\$1.50
2 Kilo Can	2.75
4 Kilo Can	5.00
Barrel powder, 50 Kilos, per kilo.....	.80
Demijohn liquid, 68 Kilos, per kilo.....	.80

All prices f. o. b. New York City.

We also handle Dugan's Invisible Patcher for patching all kinds of Limestone and Bluestone.

St. James Bldg., Broadway and Twenty-sixth St.

MICHAEL COHEN & CO.

NEW YORK CITY.

Agents for the Pacific Coast, Eccles & Smith Co., 71 First St., San Francisco, Cal.

Agents for Chicago, Ill., and vicinity, Messrs. Brunner & Lay, 570 West Polk St., Chicago, Ill.

20th Century Concrete Mixer



*Runs on its
own power
like an auto*

The 20th Century has 4 points of advantage:

- 1—Low Hoppers, 27" high.
- 2—Absolute proportions.
- 3—Traction.
- 4—Semi-steel castings.

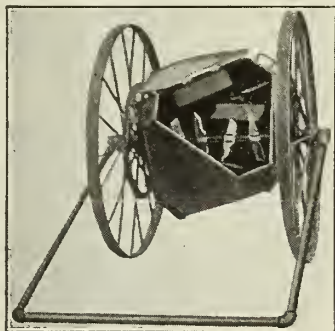
The ideal machine for sidewalk, curb and gutter and street paving.

Write for catalogue.

20th Century Mixer Co.

Connerville, Ind.

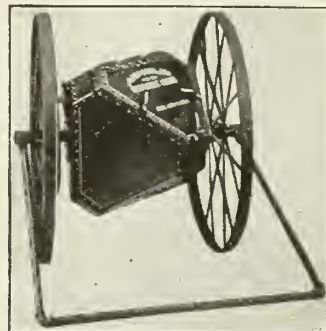
Arnold Concrete Mixer



A hand Traction Mixer Completely Operated by Two Men

NO CRANK TO TURN.

Concrete Mixed While the Materials Are Being Wheeled from the Stock Piles to the Forms.



THE ONLY REALLY PORTABLE MIXER ON THE MARKET.

It does away with the use of wheelbarrows, mixing boards and mortar boxes. Mixes, conveys and deposits, all in one operation. ONLY ONE HANDLING OF THE MATERIALS.

If You have No Mixer Here is Your Chance to Get One, at a Low Cost, that will Enable You to Compete with Anyone

If You Have a Power Mixer You Need the Arnold Mixers to Use on Your Flat Work and Small Jobs.

Capacity, per man, 5 cubic yards, mixed and placed, per 8-hour day.

Write today for full particulars to, (Agents wanted in unoccupied territory.)

F. T. ARNOLD

224 Williams Street.

NEW LONDON, CONN.

C. F. Blount, Southern Sales Agent, 522 Grant Bldg., Atlanta, Ga.

The Most Convincing Reason Why You Should Use the Eureka Mixer

Is the Strong Endorsement Of Its Users



Fifth Avenue Bldg., New York, Maynicke & Franke, Architects.
Concrete mixed in Eureka.

250 Eureka's used in New York City.

From Eminent Architects

Robert Maynicke
Julius Franke

MAYNICKE & FRANKE,
Architects,
25 Madison Square North,
New York.

Dear Sirs:

Nov. 16, 1910.

In answer to your inquiry we wish to say that on many of our buildings during the last few years we have specified that all mortar and concrete be mixed by mechanical proportional mixers, and we found without exception that the Contractors have used your mixer, which has given us good satisfaction and which we believe to be, for the erection of buildings, the best mixer that has ever come to our attention.

To Eureka Machine Co.

J. F.

Lansing Mich.

Yours truly,

MAYNICKE & FRANKE.

Write any Eureka user in your locality (we will furnish list) and get his opinion. You will find it universally true that wherever you see a Eureka user you see a Eureka booster.

We do not believe we have a single customer who wouldn't advise you to use the Eureka for its better service and money making advantages. We are convinced that no manufacturer of machinery ever had a more enthusiastic lot of boosters. And the confidence, loyalty and support that has come to us through many years of earnest determination, we shall strive to keep and increase in volume.

Your business is especially solicited because we believe we can please you—because we can satisfy you more completely than you even expected. You will be surprised at the better results the Eureka will give you.

Catalog No. 16 is ready—yours for the asking.

Eureka Machine Company

LANSING, MICH, 60 Handy St.

General Eastern Agents, W. V. Johnson & Co., 1 Madison Ave., New York.

Simmons Sectional Concrete Pile Casings

Are Carrying the Dead Loads of Buildings and the Live Roads of Railroads

Over 2,000 Linear Feet are Supporting New York Structures



For underpinning and where head room is limited, this construction of a pile is unequaled.



We have instances where a pile has been driven over sixty feet without losing its alignment or buckling.

They can be hammered, jacked or jetted in place. Piles of any ultimate length can be built up during the progress of driving.

The sections can be made from 4 to 20 feet long to suit the conditions. Our stocks can be drawn from to supply any desired length of piles.

Send for circulars and prices.

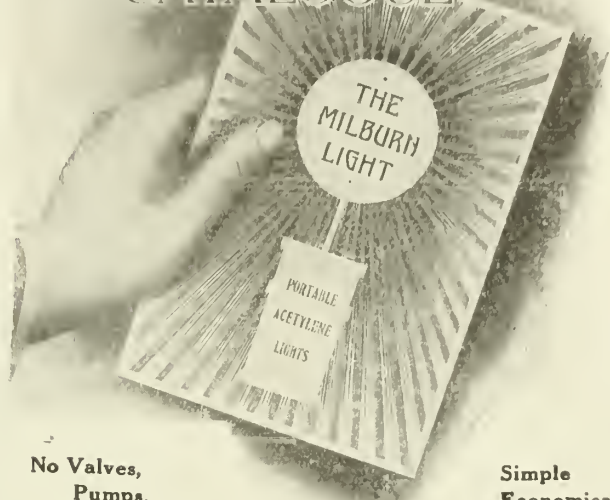


We are equipped for all kinds of Special Machine Shop Work—in Piping, Columns, Railings, Roof Structures, Cold Storage, Flag Poles, Fittings, Valves, Tools and Specialties for Contractors, Engineers, Water Works and Industrial Plants.

John Simmons Co.
101 Centre Street New York

Milburn Acetylene Lights

SEND FOR NEW 48 PAGED CATALOGUE



No Valves,
Pumps,
Gauges

Simple
Economical
Reliable

50 to 24,000 Candle Power

For Concrete and all Kinds of Construction Work

THE ALEXANDER E. MILBURN CO.

505-507 W. Lombard St.

BALTIMORE, MD.

Ottawa Silica Company

Ottawa, Illinois

Largest Miners and Shippers of White Sand in the United States

Washed and Steam-Dried

White Sand

Unexcelled for

Facing Concrete Blocks, Ornamental Concrete Stone, White Plaster, Exterior Plastering, Roofing, Sawing Stone, Marble, etc.

You can order less than a carload, in fact shipments as small as five 175 lb. bags can be delivered economically

Analysis 99.90 Pur Silica

Prices, Freight Rates and Samples on Application

Anti-Stick

Helps You Right Where You Need Help

ABSOLUTELY PREVENTS concrete from sticking to steel, wood, concrete, gelatin, Plaster of Paris, and in fact all material used for form work.

Gives a smooth onion-skin surface to the concrete. Shipped in liquid form.

Used with poured concrete only. No oils.

The greatest help that has come to concrete users.

Anti-Damp

The old reliable damp-proofing for concrete surfaces. Put on with a paint brush.

Wins the day where others fail. Tested under extreme conditions. Supplied in colors or transparent.

Our products used the world over.

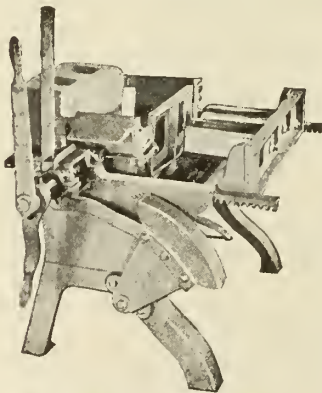
Write us for prices and detail information.

The Anti-Stick Company

Westerville, Ohio.

HAYDEN CONCRETE BLOCK MACHINERY

buy of an old established company, one that you know is going to be in business in case you want repair parts, or want to add a second machine to your equipment. Our line is large. Tell us just what machines you are interested in and we'll send booklets describing those machines.

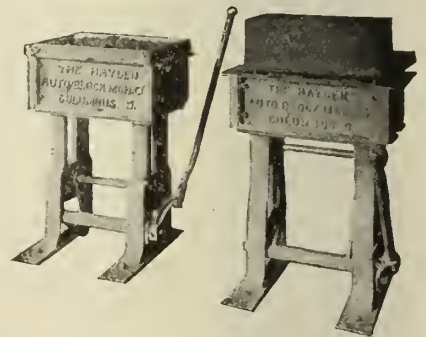


Hayden Automatic Down-Face Block Machine

Made in the following sizes: 16, 18, 20, 24, 32 and 36 inch. Built on correct principles—one of the oldest face-down block machines on the market. It has been kept right up to the minute with modern improvements.

Hayden Stripper—For Plain Face Block

The Hayden Stripper is used in turning out standard blocks of plain design, for stucco walls, foundations, etc. It pays for itself quickly. You don't have to operate an expensive machine on a low-priced product—make your plain blocks on the Stripper. Wet mix may be used.



Any Pallet Will Fit Them: We build these machines to fit any pallet no matter what size or make, at no extra cost to you.



Concrete Mixers
Highest grade concrete mixers. Write us before buying.



Block Maker's Trowel

Only trowel on the market designed specially for the block maker. Blade of the best saw steel, highly tempered and polished, with edges slightly rounded. Size 12 in. long, 5 in. wide. Very durable; brass handle; adjustable so worn blade may be replaced by a new one.



Ornamental Molds

You can order molds for a few ornamental pieces—pedestals, columns, caps, etc.—and as the demand increases for product, add to your line. Ask about our adjustable Angle Molds, adjustable Sill and Lintel Molds, etc.

HAYDEN AUTOMATIC BLOCK MACHINE COMPANY

112 West
Broad St.,

Columbus, Ohio

A Continuous Steel Concreting Surface

forms a part of the rigid and simple reinforcement of this ideal sidewalk light construction. Steel ribbed forms of span lengths interlock at sides. Holes in top receive glasses, which bear on all four sides of hole and center themselves. Steel rods are then run both ways between glasses to provide additional strength.

BERGER'S *Raydiant* SIDEWALK LIGHTS

require no wooden forms—save time and labor—give the greatest lighting surface—can be equipped with glasses for every requirement—are economical to the contractor as well as the owner—form the most efficient and strongest sidewalk light construction made—and make a poor job impossible.

Write for "Raydiant"—it describes what a safe sidewalk light construction should be.

The Berger Mfg. Co.

New York
Boston
Philadelphia
Atlanta

CANTON,
OHIO

St. Louis
Minneapolis
San Francisco

Also manufacturers of Concrete Sidewalk Forms, Rib-Trus, Ferro-Lithic and Multiplex Reinforcing Plates, Metal Lumber, Expanded Metal Lath, Prong Lock Studs and Furring, etc.

"The Last Three Years It Has Been Used Continuously on the City Sidewalk and Curbing Contract"



No. 12 Coltrin

The Knickerbocker Co.,
Jackson, Michigan.

Jackson, Michigan, Dec. 1, 1911.

Gentlemen:—We have used the Coltrin Mixer for the past five years, during the last three years of which it has been used continuously on the city sidewalk and curbing contract. We have used other mixers but have found none as handy to use and requiring so few repairs as the Coltrin.

Perfect satisfaction with the performance of your machine induces us to write you this which you are at liberty to use as you see fit.

Yours respectfully,

H. A. NORTHROP & CO.,
Per L. Northrop.

The Coltrin Continuous Batch Mixers

Steam, Electric, Gasoline, Stationary, Hand Power.

Shipped Anywhere on Five Days' Trial. Write for 1912 Catalog.

THE KNICKERBOCKER CO. - - - Jackson, Michigan

ADVERTISERS' NOTICE

Changes in copy and discontinuance orders for May number of CONCRETE must reach this office not later than April 20.

New advertising can be accepted as late as May 1.

CONCRETE PUBLISHING CO.

Detroit, Mich.

MASON SAFETY TREAD

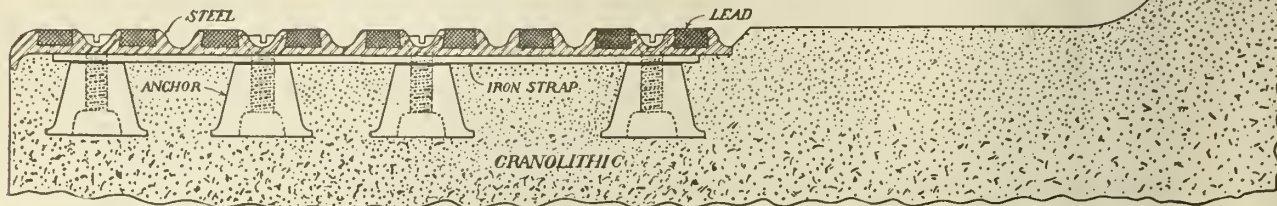
THE ONLY PERFECTLY SAFE TREAD

Should be used on all STEPS—ESPECIALLY CEMENT, also on all public floors and sidewalks. An absolute preventive against slipping on stairs, landings, inclined ways, car steps, sidewalks or any place that may become smooth. Can be fastened to anything, new or old. Will outwear any other surface. In use in every commercial center in America. Write for catalog giving full description and showing where it is in use near you.

American Mason Safety Tread Co., 704 Old South Building, Boston, Mass.

7½" WIDE WITH NOSING EDGE

MASON SAFETY TREAD



15 Days Absolutely Free Trial

You to be sole judge at the end of that time—
if you will purchase a Sanford Press Block Machine.

It is a fact that concrete blocks made by the pressure method are more dense, more uniform, with sharper corners that are as dense as the center of the block, than can possibly be made by the tamp method.

This means more profits.

It is a fact that in the saving of labor cost alone you can pay for a Sanford Press in six months' time, to say nothing about the better quality of block that you turn out.

This means more profits.

It is a fact that you can double your output on a Sanford Press with the same amount of labor cost. You will have no trouble in securing men because the work is easier, and your blocks at the end of the day have the same density as the first block made in the morning. This means more profits.

This machine is interchangeable and can be adjusted to make blocks from 4 to 24" in length, 6 and 8" height of face, 4, 6, 8, 10 and 12" thickness of wall; fractional parts to full capacity of the machine are made at one operation, and any

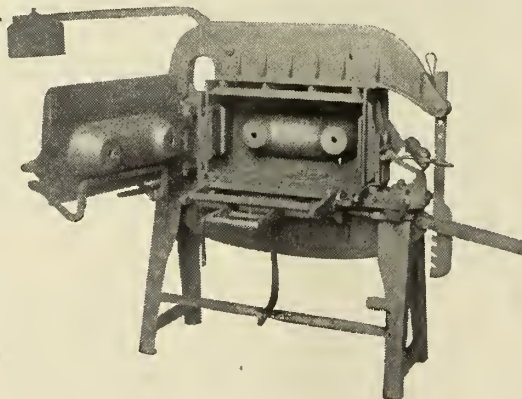
face design that may be desired.

You can make any curve or angle block, header bond two-piece system, metal tie two-piece system, slab or veneer block, hollow block, with vertical and horizontal air space, silos, water tables, etc.

You can face your block on one or all four sides at one operation of the machine. In fact, you can make anything that is ordinarily required in building construction.

It is absolutely the only down-faced hollow block pressure machine on the market, and is protected by

broad basic patents.



**SEND FOR
MIXER PROPOSITION**

You take no risk—just say the word and a "Sanford" will be placed in your plant to be tested out to your own satisfaction for 15 DAYS.

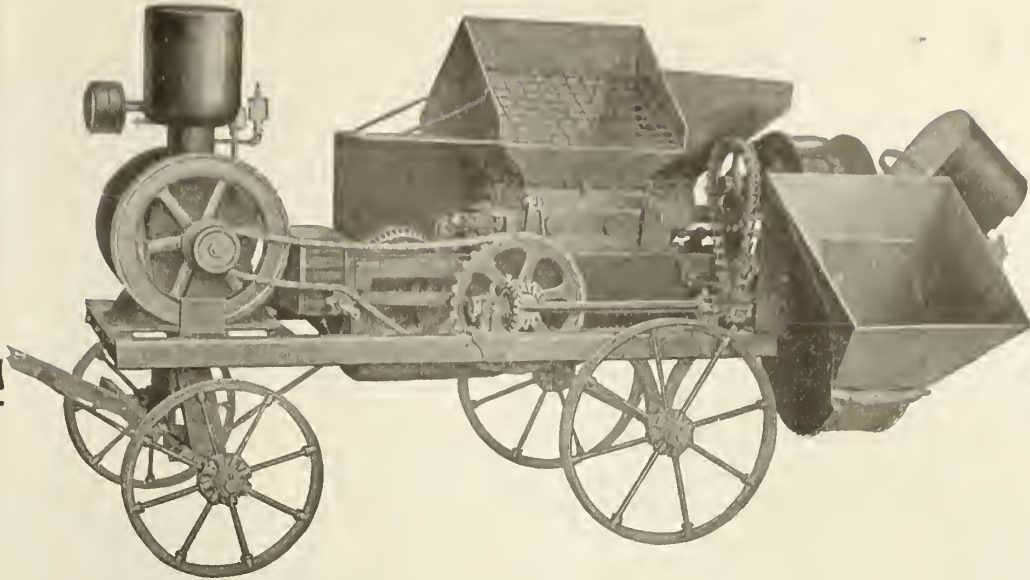
ABSOLUTELY FREE TRIAL

You are under no obligation at the end of the free trial—if you can fairly say that the "Sanford" does not turn out a better block and more of them—you send it back.

Think of that. Write today and get full information on the GREATEST BLOCK MACHINE offer ever made. Send us your name and address and we will send you a proposition that will certainly open your eyes. Be on the safe side and write us NOW. There is not a better machine made at any price. Don't wait—do it now while you think about it.

The Sanford Concrete Machinery Company

Suite 503 The Nasby Building
TOLEDO, OHIO



U. S. Standard Senior B. Concrete Mixer

This type of the well known U. S. Standard Self-Proportioning Continuous Mixers is a three-hopper machine designed for general contract work. It accurately proportions cement, sand and gravel or stone up to 2½ in. in diameter, and feeds these materials positively. Capacity, 90 to 100 yards per day. Note the low down stone hopper.

Special types for all kinds of concrete work. Ask about our Block Plant Mixer, mounted on steel base.

Get Our Catalog

Our new catalog D will save money for you. Lists continuous mixers and face-down block machines.

Write for a copy today.

The Ashland Steel Range & Mfg. Co.

MANUFACTURERS OF

U. S. Standard Concrete Machinery

ASHLAND, OHIO.

U. S. Standard Face- Down Block Machine

One of the oldest face-down machines on the market. From four to six oval cores in each block, cutting down material costs without weakening the block. Use wetter mixture than with other machines.

If you are in the market for a block machine, write for full information about the U. S. Standard.

TAKE OUR WORD FOR IT

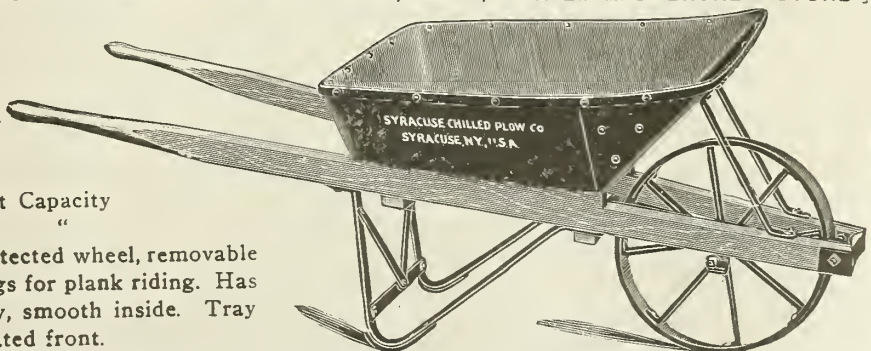
THE MOST PERFECT BARROW FOR HANDLING LIQUID CONCRETE, SAND, GRAVEL AND BROKEN STONE

ORDER A TRIAL LOT ON OUR SAY SO

After that you will never be in doubt
as to what Barrow to buy

No. 75-A 3½ Cubic Feet Capacity
No. 79-A 4 " " " "

Is an end dumping Barrow, has protected wheel, removable shoes on legs, cross bar between legs for plank riding. Has an extra strong strapped steel tray, smooth inside. Tray placed well forward and with elevated front.



SYRACUSE CHILLED PLOW COMPANY, SYRACUSE, N. Y.

THE KOEHRING

3 In 1 Principle of Mixing Means Three Times as Much Mixing

Three times as much mixing in a given time or an equal amount of mixing in one-third of the time.

It is all due to the fact that there are three independent and opposed continuous mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

There is a cutting through at the bottom and lifting and pouring of material from the side and end-to-end mixing, breaking the material over against the heavy cast drum heads and a cataract flow off the inner end of the discharge chute, producing a thoroughness of mixing, a rapidity of mixing and a uniformity of mixing no other machine equals.

There are almost equally important advantages in the mechanical construction of the Koehring Mixer.

The heavy cast special metal Koehring drum will outlast the drum of any other mixer..

The trunion rollers are keyed onto the axles and rotate as a unit precisely in the same manner as a railroad truck, making impossible "wabby" drums and rollers.

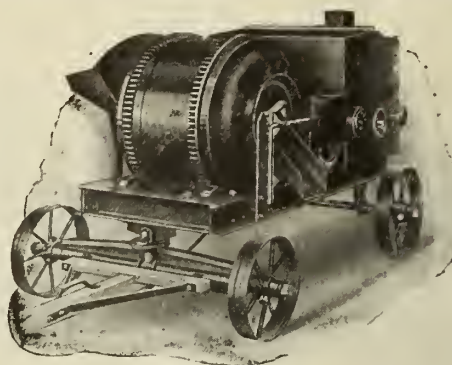
The charging bucket raises to nearly vertical position, enabling all material to pass into drum without pounding the bucket.

Why not write for our catalogue?

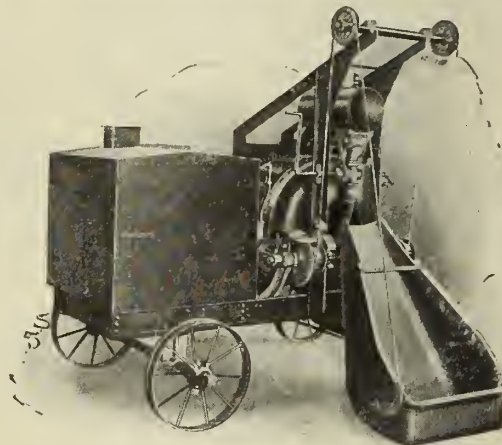
KOEHRING MACHINE CO., Milwaukee, Wis.

KOEHRING MIXER AGENCIES

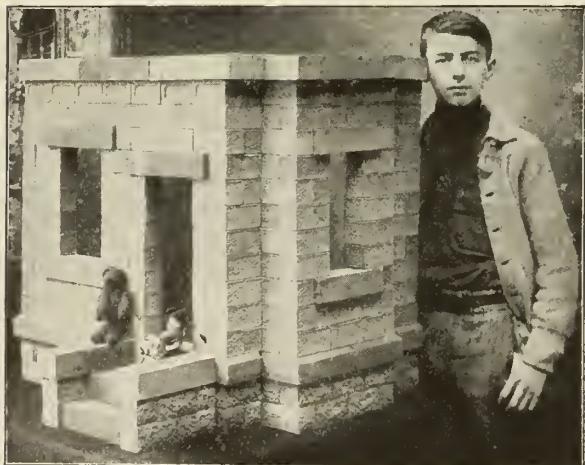
Baltimore, Md.—Thomas M. Brown, 32 Kneckerbocker Bldg.
 Birmingham, Ala.—J. F. Donahoo Co., 8th Floor Woodward Bldg.
 Boston, Mass.—P. O. Johnson 70 Kilby Street.
 Butte, Mont.—Montana Lime & Flux Co., 501 W. Galena.
 Charleston, S. C.—Carolina Portland Cement Co.
 Chicago, Ill.—Koehring Machine Co., 857 Peoples Gas Bldg.
 Columbus, Ohio—Williams Contractors Supply Co., 8th Floor Brunson Bldg.
 Dallas, Texas—Wm. T. Fulton Co., 2035 Commerce St.
 Denver, Colo.—H. S. Hitchman Co., 411 Nassau Bldg.
 Detroit, Mich.—Good Roads Supply Co., 1408 Ford Bldg.
 El Paso, Texas—Wm. Jennings Co., 411 Roberts-Banner Bldg.
 Grand Rapids, Mich.—A. B. Zierlyn & Co., 324 Houseman Bldg.
 Greensboro, N. C.—E. F. Graven, 303 Walker Ave.
 Kansas City, Mo.—Koehring Machine Co., 808 Victor Bldg.
 Los Angeles, Cal.—California Machinery & Equipment Co., 630 Higgins Bldg.
 Louisville, Ky.—Chandler-Burgy Co., 42 Todd Bldg.
 Memphis, Tenn.—P. H. Linz, 44 Byrd Bldg.
 Minneapolis, Minn.—D. F. Bowler Equipment Co., 208 Palace Bldg.
 Newark, N. J.—Abbey-Brooks Co., 3 Passaic St.
 New Orleans, La.—Wm. E. Joor, 802 Perrin Bldg.
 Philadelphia, Pa.—Lee T. Ward Co., 688 Bourse Bldg.
 Pittsburgh, Pa.—Carlin Machinery & Supply Co., Sandusky and Lacock Sts.
 Rochester, N. Y.—H. B. Trevor Co., 144 Cutler Bldg.
 Salt Lake City, Utah.—Harris Bros., 310 Atlas Bldg.
 San Francisco, Cal.—Hicks, Neil & Marks, 604 Mission St.
 San Antonio, Texas.—Alamo Iron Works.
 Seattle, Wash.—Moran Engineering Co., 1246 First Ave. So.
 St. Louis, Mo.—C. E. Robideaux, 1510 Chemical Bldg.
 Toronto, Ont.—Canada Foundry Co., Ltd.



Equipped with Standard Hopper Showing House over Gasoline Engine.



Charging Side View. Equipped with Side Loader, Water Tank and Gasoline Engine.



SOMETHING FINE FOR YOUR BOY AND FOR YOURSELF ALSO

The cut shows a Doll's House the boy has built for his sister, using real hollow cement blocks, made by himself in the SIMPSON JUNIOR CEMENT BUILDING BLOCK OUTFIT. This is only one of scores of houses of all kinds that he can build—a work shop for himself, a chicken coop, a dog kennel, an enclosure for a garbage can, models of residences, schools, churches, stores, etc. Notice the rock face foundation blocks, the bush hammer range blocks, the panel face blocks, the water table, cornices, copings, steps, window and door sills and caps. The Junior Outfit produces them all. This is the latest addition to the list of

SIMPSON MOLDS

It has wonderful possibilities and is the greatest educational toy a boy ever had—but it is very much more than a toy. The price is THREE DOLLARS, by express, charges prepaid to any point in the United States. We have a special circular telling all about it which we would like to send you.

But this is only one small feature of our business, which is chiefly the manufacture of molds for

Porch Trimmings, Garden Furniture and other Ornamental Work

OUR CATALOGUE IS THE GREATEST IN THIS LINE EVER ISSUED. CONTAINING A GREAT NUMBER OF SPECIAL HALF-TONE ENGRAVINGS OF FINISHED PORCHES AND OTHER STRUCTURES. SEND FOR IT, USING YOUR BUSINESS STATIONERY OR ENCLOSING YOUR BUSINESS CARD.

THE SIMPSON CEMENT MOLD CO.

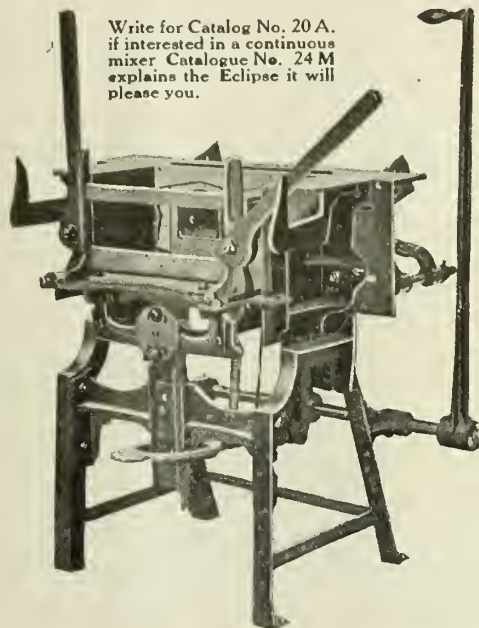
101 VINE ST., COLUMBUS, OHIO.

In writing Advertisers please mention CONCRETE.

Do You Want { Adjustability
Simplicity
Low Cost and
Guaranteed
Satisfaction ?

Then Instal An

Eclipse Down Face Cement Block Machine



Write for Catalog No. 20 A, if interested in a continuous mixer. Catalogue No. 24 M explains the Eclipse it will please you.

Made in four sizes. Prices \$35.00 to \$125.08

Will make stone 4, 6, 8, 10 and 12 inches wide by 4, 6, 8, 10, 12, 14 and 16 inches long and can be furnished with either 16, 18, 20 or 24 in. equipment.

Geo. C. Christopher & Son
Wichita, Kans.

BE THE FIRST

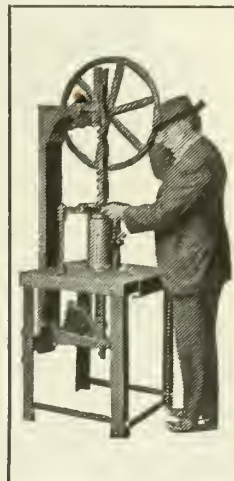
Man in your neighborhood to prepare for the season's business by getting a

Cardiff Cement

Tile Machine

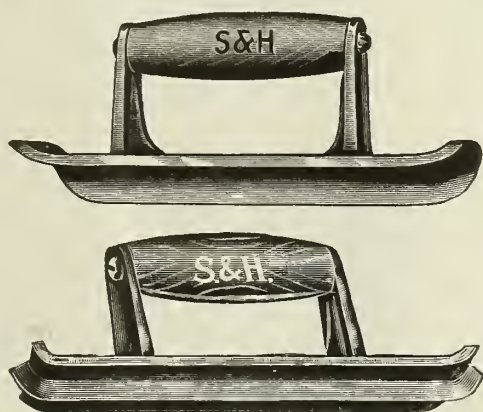
With the age of tile on farms has come a demand for Cement Tile as the best and cheapest made. With a Cardiff machine in your plant you can get the tile business of your vicinity. That will be quite an addition to your business. There is a nice round profit attached to it.

Then there are rainy days when you can't make side-walks or do other outside work. A Cardiff Machine will keep up your income on such days.



LEAVITT
Manufacturing Co.

Box C,
Urbana, Illinois.



S. & H. TOOLS

have always been in the lead because they are the best.

Ask your Dealer for them
or send for Catalog

Smith & Holtum Manufacturing Co.

Clinton, Wisconsin

Machinery and Supplies

¶ If you don't see what you want advertised, ask us about it. We can tell you where to get it and what it will cost.

Buyers and Sellers Dept.
Concrete Pub. Co., Detroit, Mich.

THERE'S A REASON WHY

No. 60, Cement Waterproofing and Bonding,
Des Moines Elaterite

Is superior to every other waterproofing and bonding material.



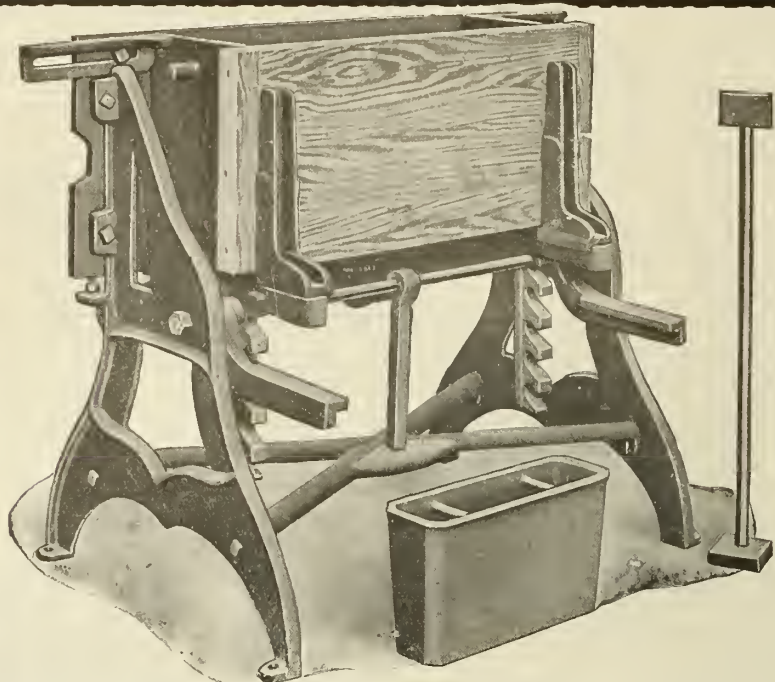
It's the natural characteristics of the rubbery pigment—intensely adhesive, bonding quality, resistance to all acids, absolutely waterproof character, permanent elasticity.

Recent tests showed adhesive, bonding strength equal to 160 lbs. per square inch, giving a permanency and a resistance to water pressure not found in any other waterproofing material.

Plaster coats are applied directly over it, the adhesive, bonding strength holding them firmly and permanently. (See cut.)

Catalogue "W" with full information on request.

THE ELATERITE PAINT & MFG. CO., **DES MOINES, IOWA**



The illustration shows my Adjustable Down-Face Block Machine. It will make blocks 16", 20" and 24" long; solid, 4" and 6" wide; hollow, 8", 10" and 12" wide. Not a small bolt or nut in it. Plates and doors changeable in a minute's time. Built solid. Many styles of face-plates. Price, complete, \$100.00.

Another very popular machine is for blocks 16" long or under, 4" and 6" wide solid blocks and 8", 10", and 12" hollow blocks. With this machine a man can buy the 8" machine and later add the 10" or 12" parts. I am going to make the price of this machine \$75.00.

SPECIAL OFFER

I have on hand 12 machines which will make blocks 8 x 8 x 16 in. These machines are similar in design to my others. I make a special offer to clean them up. Price, while they last..... **\$32.00**

You can always get repair parts for these from me—but I build 'em generally so they won't need repairs.

I HAVE been making concrete block machines for seven years. I run a foundry here in Jackson. Ask anybody about town what kind of a man I am—you'll get a report that will convince you that you can bank on what I say.

I've perfected a common, everyday block machine that will make a wider range of block, faster and cheaper, than any machine on the market within speaking distance of the price of mine.

My machine is built heavy. It will stand the racket. I make the castings in my own foundry and machine them in my own shop. I charge a fair price for the machine—no fancy patent royalties, no extras—just a fair profit on the work and the pig iron.

If you want an honest block machine at a reasonable price, drop me a card. My catalog is not much on expensive illustrations, but it's there with the interesting details.

Write me tonight.

Wm. Cobb

Foundry

209 Clinton St., Jackson, Mich.



Send for Descriptive
Booklet NOW

Making ready to insert the floor beams.

Van Guilder Hollow Wall Concrete Machine--- Continuous Air Chamber from Cellar to Roof

Steel Reinforced Throughout

Completely revolutionizing building methods.

We manufacture and build with one operation; saving manufacturers' profits, transportation charges and half the labor cost, producing a more durable and up-to-date building. Only one machine needed for each job.

Van Guilder Houses Cost Less than Wood and Sell
Quick at a Wonderful Advance

They have stood the test for over four years and are long past the experimental stage.

This superior construction was immediately approved by the building department of the city of New York, one of the most severe and conservative boards in the world.

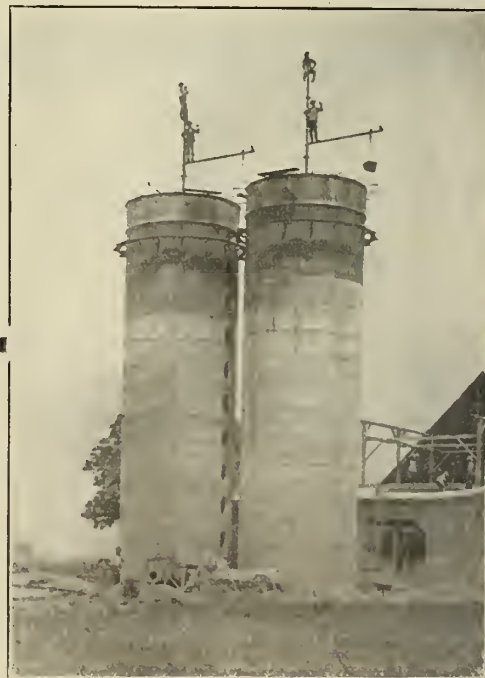
SILO WALLS

Our curved silo machine produces a silo which is waterproof and frostproof, greatly improving the quality of the ensilage. The most economical and durable construction in the world.

Van Guilder Hollow Wall Company

728 Chamber of Commerce Bldg.

Rochester, N. Y.



A Mixture of

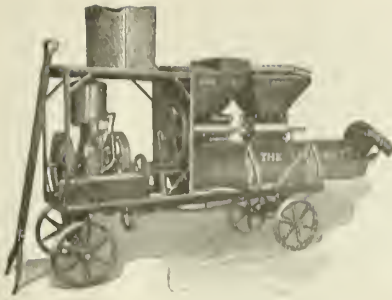
The best cement in the world
The best sand in the world
The best gravel in the world
The best steel in the world

will not make a beautifully straight and smooth job of concrete work on which the contractor can make the money he should—unless this mixture is handled properly and cheaply. There are many good brands of cement and steel, but there is only one Polk System of Monolithic Construction. The Polk System has merits that are exclusive. It is thru it's virtues that you are able to build cheaply, safely and straight. It represents economy. The Polk System lowers construction costs and your investment to the happy medium, where by combining good raw materials with IT, you can build up a bank account. *Everybody loves a Bank Account.*

Write us for particulars now: it's the Polk System you want.

"It Renders the Service"

POLK-GENUNG-POLK COMPANY, Inc., Fort Branch, Indiana



Showing Mixer With Stone Hopper

How Your Neighbor Makes Money

YOU profit by the experience of others, or, in other words, we profit by the experience of *each other*. For instance—if John Jones is putting money in the bank by making cement tile and brick, don't you stand the same chance? And if Sam Brown is cleaning up a bunch of money by using an up-to-the-minute mixer, what's keeping you from doing the same thing? Take an inventory of yourself, and then let us tell you how John Jones and Sam Brown are doing it with

"Crescent" Continuous Concrete Mixers—The simplest, strongest, most practical and handy mixers on the market. Proportions wet and dry materials accurately, and mixes thoroughly. The price is low. Every cement worker should have one. We guarantee it.

"Crescent" Sewer Pipe and Tile Molds—Used the world over, and by Uncle Sam in his reclamation work. All sizes 4" to 48". Bell-up or bell-down on same mold, with or without pallets. We employ over 500 patterns in making pipe and tile molds alone. We can explain every "in and out" of this business.

"Crescent" Vertical Tamping Brick Machines—The only practical and scientifically correct machine on the market. Our 1912 model has a big feature that revolutionizes brick machines—the combined hopper, stripper and finisher, combined and patent facing plate. You will want it if you see it.

"Crescent" Power Tile Machines—To make tile 3" to 10". The price is very low. This machine alone is a big profit producer. Can be operated by one man. Utmost strength. Exclusive features.



"Crescent" Sewer Pipe Mold

SEND THIS NOW

Raber & Lang Mfg. Co.
802 Mill St. Kendallville, Ind.

Fill Out and Send to Us

Raber & Lang Mfg. Co.,
Kendallville, Ind.,

Please send prices and free literature on the following:

☐ Mixers ☐ Tile Molds ☐ Brick Machine ☐ Power Tile Machine

Name
Address

Mr. Contractor,
Everywhere

Dear Sir:

Start the season right. Buy a National Mixer. Use good materials, and your work will be a credit to your ability and judgement.

Yours for business,

NATIONAL MIXER CO.,
641 Mercantile Bldg.,
Rochester, N. Y.



HESS MEDICINE SANITARY CABINET LOCKER

The Only Modern, Sanitary STEEL Medicine Cabinet

or locker, finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimmings. Steel or glass shelves.

Costs Less Than Wood

Never warps, shrinks, nor swells. Dust and vermin proof, easily cleaned.

Should Be in Every Bath Room

The Recessed Steel Medicine Cabinet

For styles—four sizes. To recess in wall or to hang outside. Send for illustrated circular.

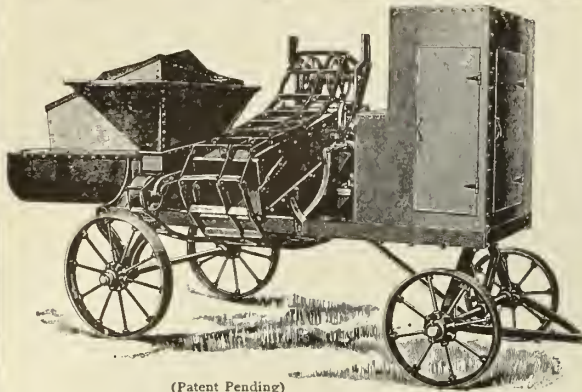
HESS, 902L Tacoma Bldg. CHICAGO
Makers of Steel Furnaces. Free Booklet.



The Outside Steel Cabinet

Men pooh, pooh, sometimes, at "Book Learning." A man's own experience certainly is the best teacher. But a man's own experience doesn't contain enough to be all-sufficient. He must know what experience other men have had. The knowledge of other men's experiences is to be found in books. Practically every book of value to the concrete worker is listed in a catalog which will be sent to you by the **CONCRETE PUBLISHING COMPANY**, 97 Fort Street West, Detroit, Michigan, merely for the asking.

THE LOW DOWN FORCE FEED CONCRETE MIXER



(Patent Pending)

Make larger profits on your concrete contracts by using the Low Down Concrete Mixer.

The low down hoppers lessen the labor about one-fourth. The feed is a positive force feed with the working parts always in plain sight. It feeds wet sand and damp cement with the same results as dry.

The mixing trough is from 12 to 18 inches longer than the average which insures a perfectly even mixture. The proportions can be readily changed while the machine is in operation. The machine is constructed of malleable iron and steel thruout.

Write for prices and catalog A.

ELITE MANUFACTURING CO.
ASHLAND - OHIO



A Concrete and Mortar Mixer

that will even mix paint with sand and cement.

Read these extracts from two well satisfied users of Blystone Mixers:

"You have a first class mortar machine as well as concrete mixer. One of my men has slaked his lime and made mortar for eight and ten masons with time to spare for other work. Can faithfully say I have saved the cost of at least one man and have made a gain of 10% more mortar per barrel of lime over the old way of hand mixing."

Here's the other one:

"For thoroughly mixing concrete it has any machine beaten that we have ever seen. We recently had an illustration of its mixing power when we put in two pounds of red paint in a batch of sand and cement and in one minute the batch had a uniform color."

We have hundreds of such letters and a number of them are given in our catalog as well as many other reasons why the Blystone surpasses any other general purpose mixer.

Write for it today.

The Blystone Machinery Co.

19 Venango Ave.

Cambridge Springs, Pa.

No. 3

The Ross Concrete Spade

is an absolute necessity where economy and efficiency are required in concrete work in forms. It produces smooth finished surfaces more quickly and better than any other tool, because it forces the heavier particles back and brings the mortar to the surface.

The Ross Concrete Spade is also now made without offset for re-inforced concrete work with either short or long handle at same price. Specify kind wanted when ordering.

Ross Concrete Spade No. 1 (Regular D handle with offset).

Ross Concrete Spade No. 2 (D handle without offset).

Ross Concrete Spade No. 3 (Long D handle without offset).

The price is \$2.50 each (Special discount in lots of one-half dozen or more at a time.) If not satisfied, return and we'll refund the price without question.

Better order today. Procrastination is the thief of profits.

Harold L. Bond Company

383 F Atlantic Ave.

BOSTON, MASS.

Harold L. Bond Company,
383 F. Atlantic Ave.,
Boston, Mass.

Please send me full details about the Ross
Concrete Spade.

Name

Address

Foreign Agents,

The (U. K.) Winget Concrete Machine

Co., Ltd.,

9 Star Buildings,

Newcastle-on-Tyne, England.

No. 1

No. 2

WHOLESALE PRICES—don't buy anything needed in concrete work until you get our catalog

Don't buy a single tool, machine or mould until you have secured a copy of our various concrete machinery and mixing catalogs. **Northwestern** prices save you money on everything used in concrete work, from a big power mixer to the smallest mould or tool. Big manufacturing facilities and operation of our own brass and machine shops, foundries, pattern and engine works, enable us to sell these goods at an enormous saving to you.

Northwestern Concrete Machinery and Tools

Send for 1912 Catalogs Our catalogs are veritable encyclopedias of information and show everything used in making and handling concrete. It will pay you to have a copy of these catalogs for your information.

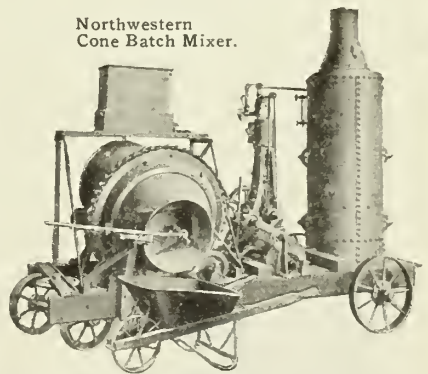
All *Northwestern* machines shipped with ten days returnable privilege with guarantee of satisfaction that insures both pleasant and profitable dealings. Secure these catalogs today and write what you are particularly interested in. It is worth your while. Prices save from 15% to 50% and the line includes everything used in any class of concrete work. It means money saving to get in touch with the Northwestern line.

Northwestern Low Down Cone Batch Mixer

Combines the mixing principles of the cone, cube, polygon and cylindrical mixers, with the mechanically shifting and scattering materials by inside paddles and scoops which are adjustable and removable, adapting this mixer for every kind of work. The mixing effect is a veritable shower and whirlwind of materials, producing a perfect mix in from 20 to 30 seconds. Low intake means speed in

filling by wheelbarrows or shovels, or with elevators—sloping bottom draws material away from intake toward discharge end which is closed, preventing slopping. Special discharging device releases any amount from shovelful to cartload. Open intake shows mix at all time—slopping is absolutely done away with.

Northwestern
Cone Batch Mixer.



Wholesale Prices

On All Concrete Machinery

Block Machines, \$10 to \$250; Brick Machines, \$22 to \$75; Mixers, \$24 to \$1,000; Porch Column and Baluster Outfits, \$15 to \$75; Cap and Sill Moulds, \$12 to \$35; Lawn Vases, \$15 to \$25; Ball Moulds, \$2 to \$17; Grave-stone Moulds, \$7 to \$69; Well Curbing Moulds, \$4 to \$7; Drain and Sewer Tile Moulds, \$6 to \$83; Block Cars, \$11 to \$17; Fence Post Moulds, \$7 to \$12; Silo Moulds, \$14 to \$150; Coping Moulds, \$18; Hitching Post Moulds, \$20; Baluster Moulds, \$6 to \$18; Jardinieres, \$12; Special Gate Post Moulds, \$10 to \$30; Newel Post Moulds, \$14; Grave Markers, \$7; Burial Vaults, \$90.

Also complete line of Cinder Crushers, Rock Crushers, Sand and Gravel Elevators, Sand Screens, in both Revolving and Stationary Type, Mortar Gauges, Wheelbarrows, Jointers, Groovers, Edgers, Corner Tools, Curb and Gutter Tools, Corrugating and Radius Tools, Roller Jointers, Brick Tongues, Curb Clamps, Curbing Edgers, Hawks, Floats, Line and Indentation Rollers, Tampers, Rammers, Name Stamps, Indentation Letters, Wall Plugs, Expanded Metal and Water Proofing, Flower Pots, etc.

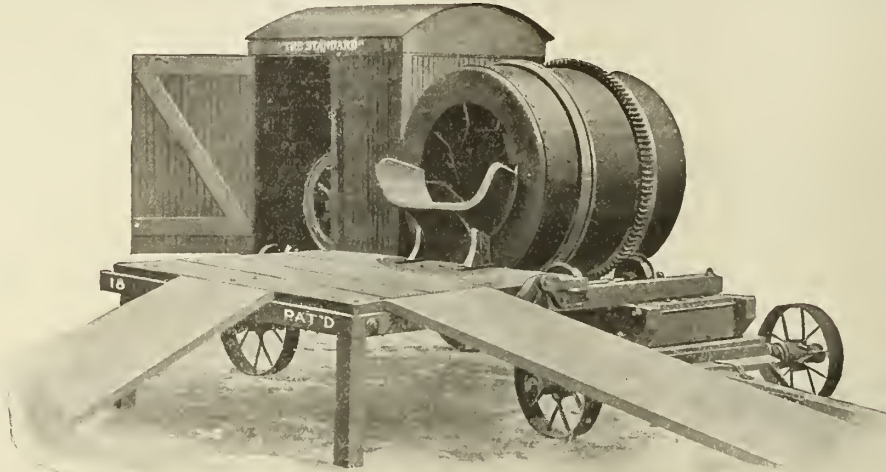
Get Our Special Catalog

Shows and describes all *Northwestern* Mixers — sidewalk mixers, contractors' mixers, continuous mixers, block plant mixers, gasoline, steam and hand mixers in all sizes from 7 ft. up. If you want to do highest quality concrete work, get this catalog and see the superior mixing ability and mechanical construction of these mixers. Write for this interesting free catalog today.

Northwestern Steel & Iron Works
1051 Spring Street
Eau Claire, Wis.

“The Standard”

Low Charging Concrete Mixer



Don't think, when buying “The Standard” Low Charging Concrete Mixer, that you will not be better pleased with the outfit than you would if you paid two or three times as much for other complicated machines with side loading hoppers and mechanism.

Many contractors using “The Standard” Low Charging Concrete Mixer, say that they would not exchange it for any other machine at any price.

In addition to our low charging mixers, we also have special designs for peculiar requirements, such as the—

“The Standard” Low Charging Mixer with Folding Platform. Shown in illustration. Platform down in mixing position.

“The Standard” Low Charging Mixer with belt drive.

“The Standard” Low Charging Mixer with cart charging arrangement.

“The Standard” Low Charging Mixer with discharging trough for street work.

“The Standard” Low Charging Mixer with hoist for mixed concrete.

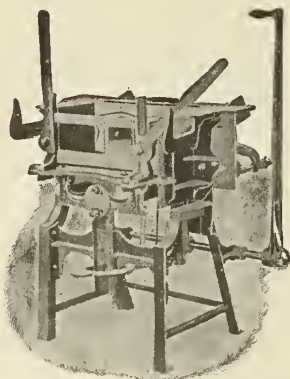
The Eclipse Stone or Block Machine.

The Perfect Brick Machine.

“The Standard” Hoists and Elevators.

Gas and Gasoline Engines.

Steam Engines and Boilers.



Ask for catalogue No. 36. The information in this catalogue will be of value to you.

The Standard Scale and Supply Co.

Chicago
1345-1347 Wabash Ave.

Pittsburgh
243-245 Water St.

Philadelphia
35 South Fourth St.

New York
136 West Broadway

Start in the Drain Tile Business

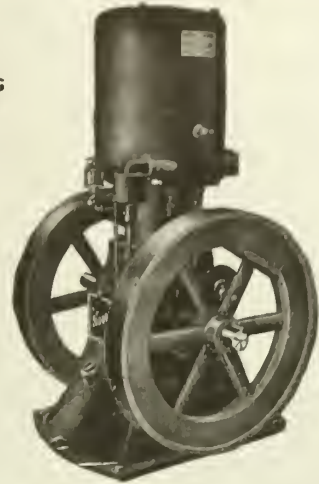
You don't need a large investment. The demand for tile is rapidly increasing and with our hand-power machine you can turn out first-class tile at low cost.

**1200 Tile per Day
per Man on
ACME
Tile Machine**

This machine makes tile from 3" to 8" in diameter, all 12¼" long. Spiral packer-head packs a strong tile. Operates rapidly and easily. Write for booklet describing this machine—it looks easy but it's really easier than it looks.

**Acme Tile
Machine Co.
LaGrange, Ind.**

**NO TANK
NO FAN
NO FREEZING
TROUBLE**



The Novo Engine Has No Lateral Vibration

—no packed water joints to leak—no heavy cooling system—no timing troubles—no freezing damage in cold weather.

There isn't another engine which meets the requirements of concrete work better than the

NOVO ENGINE

"The Engine for Every Purpose"

It is simple in construction, easy to start and run in all weathers, and readily portable—the lightest engine for power developed. Made in from 1 to 10 H. P., and is guaranteed to deliver it. The cooling system is self-contained and is proof against damage from freezing. Splash system lubricates perfectly main bearings and working parts, which are enclosed so dirt cannot get at them.

The Novo is an ideal engine for concrete work and you owe it to your business to look into it thoroughly.

Send for Novo Catalog

and get all the facts.

Send for the catalog now while you think of it.

Novo Engine Company

Clarence E. Bement, Sec'y and Gen'l Mgr.
221 Willow St., Lansing, Mich.

Write us for facts and figures.



COMMON SENSE

Tells You This Wall is Waterproof

Water can't pass through metal ties. It can pass through any concrete connection between the outer and inner wall of a house.

Blocks made on our block machine make a wall like the one shown. These blocks sell easily. They please architects and owners.

The machine is easily operated. One man can make and rack 150 blocks per day. Get out of the old rut and buy a machine that will put you beyond the reach of competition. Write for our catalog. It'll show you how to get out of the woods—how to make money in this concrete business.

**Cherry Valley
Iron Wks.**

Monroe, Wash.

Agents Wanted

All over the country, to handle this machine. No agent need apply who handles any other block machine.



OPERATION COMPLETED
READY TO DETACH

This system ties over 1,000,000 bags each day.

THE CURRY TYER GUARANTEES

Greatly reduced labor costs,

Three times faster than pliers.

Mechanically uniform tightness of tie,

Secure. Eliminates careless tying.

Cheapest laborers can operate successfully,

Eliminates skilled laborers.

Full speed in cold weather.

Tools are not lost or stolen.

Ties are exactly fitted to rods

No lost time or waste cutting wire.

Catalog G, prices and information
on request.

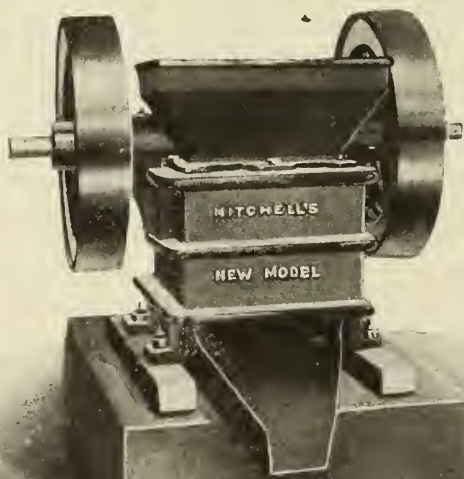
Clifford L. Miller & Co.,

110 East 23rd St.

SOLE AGENTS

New York, U. S. A.

1912
MODEL



To Be or Not
to Be Without
a "Mitchell"—that
is the Question

?

After you receive our new 1912 catalog and have investigated the Mitchell Improved Crusher and

found it to be the most efficient, most economical, as well as the simplest and most durable then ask yourself "Can I afford to be without a Mitchell?"

No matter what you crush, the Mitchell will save you money. It has a score of exclusive features—made in 15 different sizes in capacities from 5 to 300 tons per 10 hour day. Write today for new 1912 catalog. You can't afford to wait.

Canadian Factory
Mitchell Crusher Mfg. Co.,
Bathurst & Niagara Sts., Toronto, Can.

Eureka Stone & Ore Crusher Co.

1-3 B Avenue
Cedar Rapids, Iowa

Read this Notice and Avoid a Law-Suit

We have begun action in the United States Courts for the purpose of upholding our patent on "Cement Filler" and "Cement Floor Paint" No. 813,841, and we are reliably informed that a number of large paint and varnish manufacturers are co-operating in the defense.

We hereby give notice of our intention to proceed legally against all unauthorized manufacturers of products infringing our said patent, as well as against consumers buying and using infringing Cement Fillers and Cement Floor Paints not made by us, or one of our licensees.

In purchasing any paint for application to cement or concrete floors, be sure that it bears a label reading "Made under the TOCH patent No. 813,841". We have agents in every large city of the United States and a number of licensees, from whom our "Cement Filler" and "Cement Floor Paint" can be obtained for prompt delivery, and strongly urge the inadvisability of buying and using any material not so labeled during the pendency of this suit, since any bond of indemnity given you by any unauthorized manufacturer will not protect you against a law-suit.

Toch Bros.

320 Fifth Avenue

Established 1848

New York, N. Y.

Inventors and Manufacturers of

"Tockolith" (patented)

"Liquid Konkerit" (patented)

"Cement Filler" (patented)

"Cement Floor Paint" (patented)

"Toxement" (patented)

"R. I. W." Damp Resisting Paints

"Toxloxpore", Copyrighted

"Everlite Koating", Copyrighted

and many original preservative and decorative compositions.

Herringbone Expanded Metal Lath

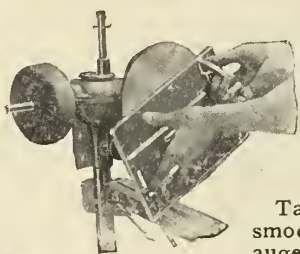
Makes partitions and ceilings that are fireproof, free from cracks, stains and falling plaster, walls that keep out rats and mice, will not harbor vermin or hold dampness, gives construction that is light but strong and practically everlasting.

The most rigid of metal laths, consequently the easiest to handle and erect. Permits wide spacing of studs without danger from sagging; gives a firm surface for the trowel, making it easy to cover and with minimum waste of plaster.

Get our new book giving all the details for all classes of metal lath work. A post card will bring it to you.

THE GENERAL FIREPROOFING CO.

44 Logan Avenue, YOUNGSTOWN, OHIO



Polishes face plates Sharpens all tools

30 DAYS FREE TRIAL

Takes but a few seconds to polish face plates smooth as glass—sharpens hatchets, saws, chisels, augers, plane bits and all other tools, in a few moments. Entire grinding outfit sent on free trial. No promises, no money needed, no red tape. Use it free 30 days, and then, if you are not anxious to keep it, return it at our expense.



Luther Dimo-Grit Tool Grinder

Dimo-Grit, the newest artificial diamond abrasive, cuts hardest steel as emery does soft copper; 25 times faster than the grindstone, 10 times more efficient than emery—no need of cooling with water—no danger of drawing temper. Built all of iron and steel, enclosed shaft drive, dust-proof bearing, easily portable, foot and engine power. Extra attachments convert it into forge, jig and circle saws, drill, lathe, etc., giving full shop equipment at extremely low cost.

**Write Today for
30 Day Free Trial Offer**

Let us send you our 40 page free book, so you can select the outfit you would want for 30 days' free trial. It fully describes Luther grinders and reprints the story of artificial diamond abrasives from McClure's Mag. Write today.

LUTHER GRINDER MFG. CO., 3130 Michigan Street, Milwaukee, Wis.



14 Machines in One

1—Fine Dimo-Grit wheel. 2—Coarse Dimo-Grit wheel. 3—Universal tool rest. 4—Chisel and plane bit guide. 5—Dimo-Grit razor hone. 6—Dimo-Grit scythe stone. 7—Dimo-Grit saw gummer. 8—Felt polishing wheel. 9—Medium Dimo-Grit wheel. 10—Cloth Buffing wheel. 11—Dimo-Grit oil stone. 12—Dimo-Grit pocket hone. 13M—Plane bit honing attachment. 14M—Twist drill sharpening attachment.

Little Giant Concrete Mixer

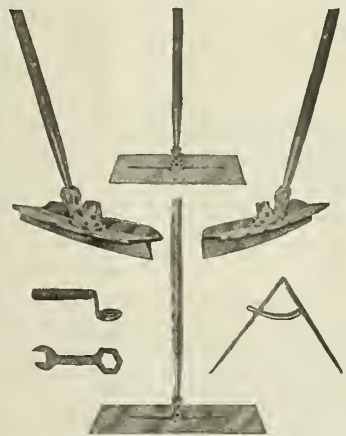


Our power models, B2 or B3, undoubtedly possess the greatest adaptability of any mixer on the American market to-day. Either model can be readily adjusted to regulate the output from 3 cubic yards per hour to 10 cubic yards per hour, by simply adjusting the gates regulating the feed. A great many contractors have told us, in the last few weeks, how well pleased they were with their LITTLE GIANT mixers. Some of these men have been using the mixer for years, and have found that their mixer turns out a perfect concrete with a minimum expense for operation, and with practically no charge for upkeep.

FREE TRIAL OFFER

We offer to demonstrate the value of this machine in your own hands, on your own work, without it costing you a cent. Ask for our proposition.

Ballou Manufacturing Company, 104 High St., Belding, Mich.



BRONZE FINISHING TOOLS

We have at last succeeded in placing on the market a BRONZE line of sidewalk tools which are sure to meet with approval from all sidewalk men. The workmanship and quality of the tools cannot be excelled and they are fully guaranteed in every respect. Write for catalog.

In addition to the bronze line we handle and make a full line of malleable iron finishing tools, concrete mixer, block machine, brick machine, steel sidewalk forms, post molds, pipe and tile molds, tile machines, fancy molds and many other machines for concrete work.

Catalog of full line FREE on request.

Arrowsmith Concrete Tool Co., Dept. C-2 Arrowsmith, Ill

HESS FURNACE

Sent on Approval



No. 45
"Leader" Hess
Steel Furnace
Price \$49.00

Delivered East of Omaha and
North of Ohio River
Taxes and Registries Extra

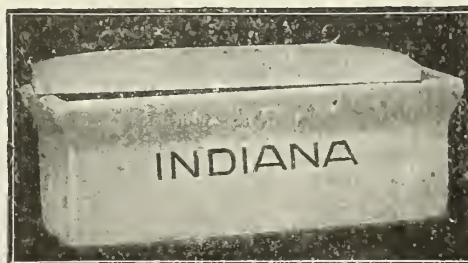
We will deliver a complete heating equipment at your station at factory prices and wait for our pay while you test it during 60 days of winter weather.

The entire outfit must satisfy you or you pay nothing. Isn't this worth looking into? Could we offer such liberal terms if we didn't know that the Hess Furnace excels in service, simplicity, efficiency, economy.

We are makers—not dealers—and will save you all middlemen's profits. No room for more details here. Write today for free 48-page booklet which tells all about it. Your name and address on a post card is sufficient.

HESS, 902 Tacoma Bldg., Chicago

Makers of Hess Sanitary Steel Lockers or Medicine Cabinets for Bath Rooms. Illustrated circular free.



We sell

**Burial
Vault
Molds**

NO TERRITORIAL RIGHTS OR ROYALTY.

Satisfied Customers' Testimony.

"We have been using your Mold for months, and are entirely satisfied."

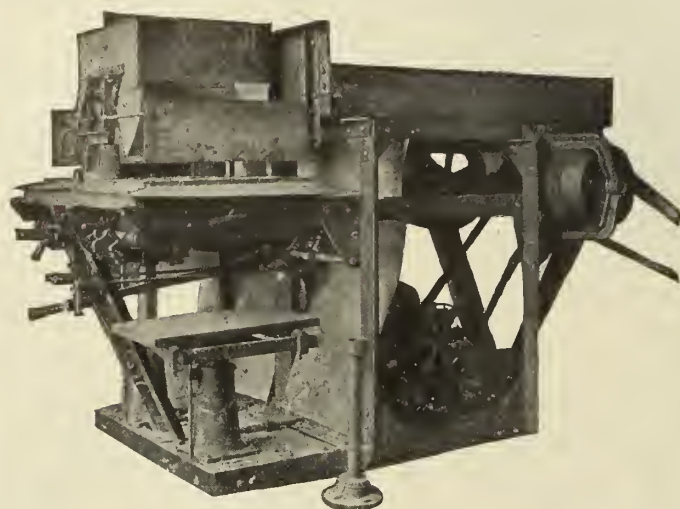
"We are getting good results with your Mo'd. and are much pleased." Write us for circulars.

INDIANA CONCRETE BURIAL VAULT CO.

780 Lemcke Bldg., Indianapolis, Ind.

The Cockburn Block Machine

WET BLOCKS made on this machinery are **WATERPROOF** because all the voids are filled



Write for particulars

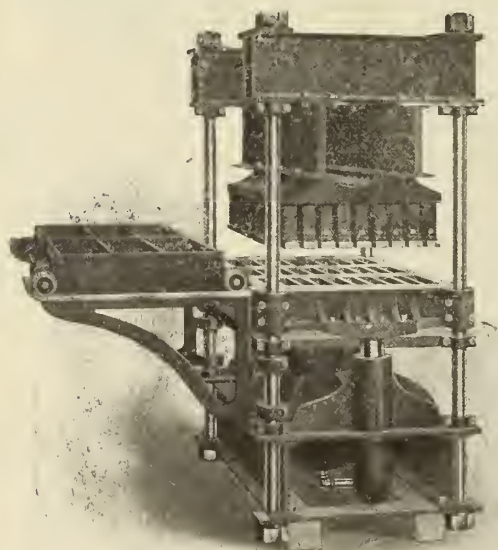
Cockburn Company

126 Liberty Street

New York, N. Y.

Buckeye Hydraulic

CEMENT BRICK MACHINE



The only successful power press on the market.
Makes 15,000 brick per day, under pressure of 200,000 pounds. We instal complete plants.
We also manufacture Mortar Mixers, Concrete Mixers and Gasoline Engines.

Write us for prices and particulars.

Buckeye Engine & Foundry Company
Joliet, Ill.

THE PERFECT

**Tamps
by Foot
Pres-
sure**



**BRICK
MACHINE**

The Brick Machine that pleases everybody. The 1912 Model with its valuable improvements has no equal or comparison in Value, in simplicity, Durability or Speed. Investigate the make-up of the PERFECT before purchasing any other.

Write for Catalogne and Prices.

C. S. WERT

Kendallville, Ind.

The Chain Belt Way

MEANS MIXING and elevating Concrete in the shortest time, at the minimum cost per yard. This photograph shows the CHAIN BELT ELEVATOR and the CHAIN BELT MIXER at work on the Boston Store, Milwaukee. Concrete is being laid at two floors at the same time. This Elevator is of steel—

self-supporting—requires no tower—has the simplest tripping device, and operates with speed and smoothness.

No More Breakdowns, No More Delays, is the slogan the users of CHAIN BELT CONCRETE MACHINERY have adopted. Ask the Contractor who owns a CHAIN BELT MIXER what he thinks of the CHAIN BELT DRIVE—the DRIVE, by the way, which we guarantee for two years. Dollars to cents he says, "No more gear-driven machines for me."

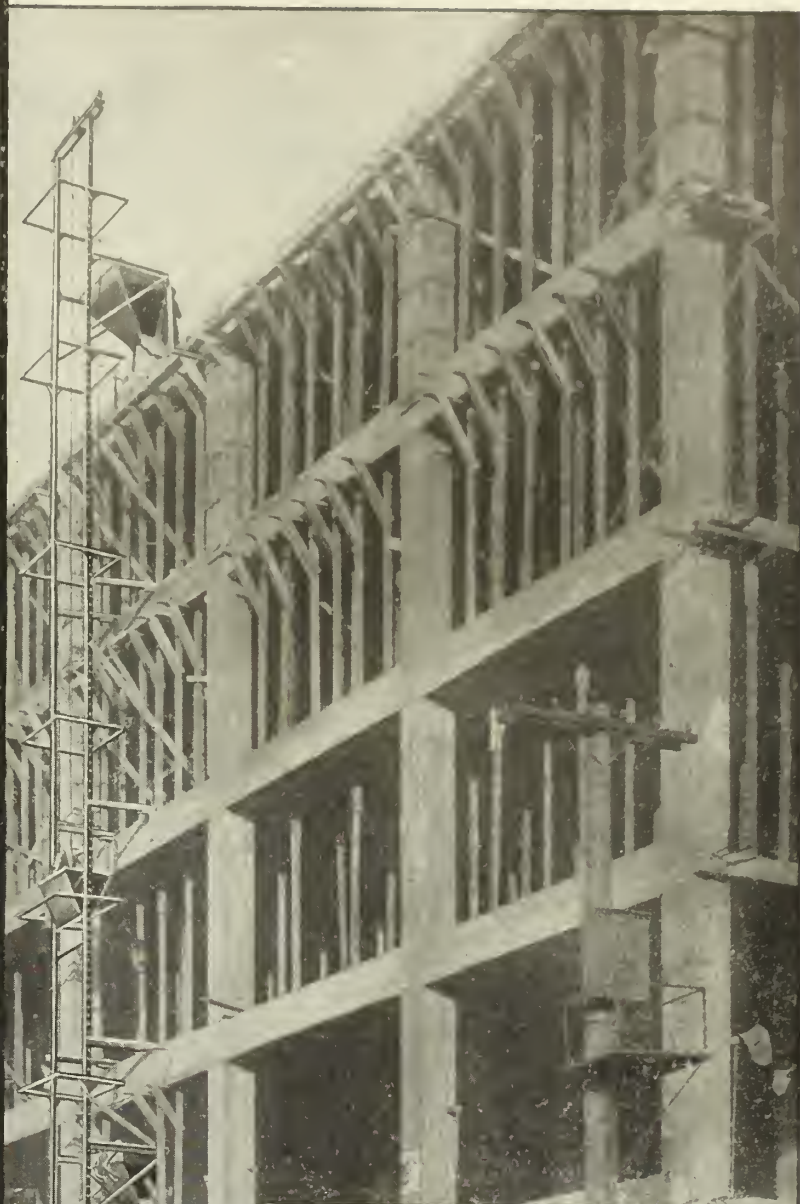
Mr. Contractor, you are wasting your time, energy and money by fooling around with a gear-driven machine. Be up to date. The CHAIN BELT DRIVE is far more practical, because it is smoother running—less friction—consumes less power—and then you don't have any gears to get clogged or wear out. As mentioned before, we guarantee this CHAIN BELT for two years. Are your gears guaranteed for this length of time? We have been selling Mixers for four years now, and haven't replaced a link of CHAIN BELT yet. We think this is a pretty good record.

Send today for information.

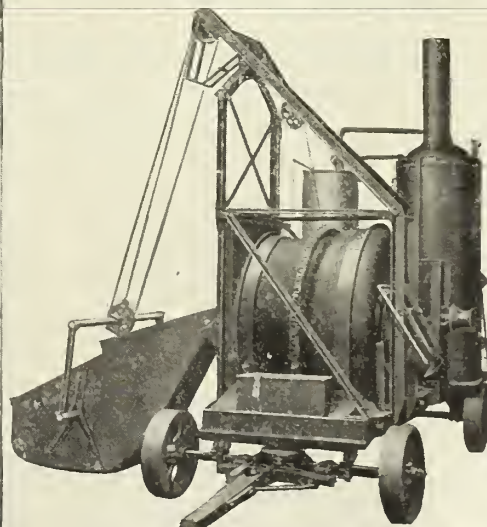
Chain Belt Company MILWAUKEE

AGENTS

Chicago, Ill., W. B. LOUER, 900 Old Colony Bldg.
Baltimore Md., Henry H. Meyer Co.
Boston, Mass., Underwood Machinery Co.
Cleveland, O., McKenna Company, Osborn Bldg.
Kansas City, Mo., James P. Sprague.
New York City, Henry J. McCoy Co., 65 Dey St.
Philadelphia, Pa., Standard Supply & Equip. Co.
Pittsburgh, Pa., Standard Supply & Equip. Co.
Portland, Ore., Loggers & Contractors Machy. Co.
Seattle, Wash., Loggers & Contractors Machy. Co.
St. Louis, Mo., Frank Fraser, 116 No. Main St.
Vancouver, B. C., Dominion Equip. & Supply Co.
Winnipeg, M. Can., Dominion Equip. & Supply Co.



Chain Belt Concrete Mixer

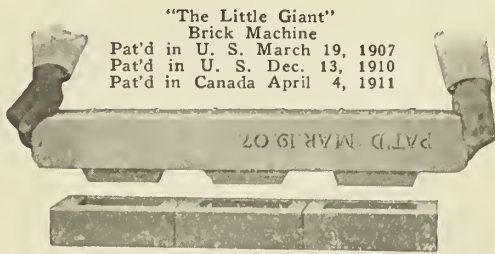


"The Mixer with the Bulge"



THE LITTLE GIANT BRICK MACHINE

OVER 4,000 LITTLE GIANTS IN USE



"The Little Giant"
Brick Machine
Pat'd in U. S. March 19, 1907
Pat'd in U. S. Dec. 13, 1910
Pat'd in Canada April 4, 1911

Special Price to mail order buyers.

WHY? BECAUSE—by the use of our removable cures you make nearly 6,000 BRICK out of same amount of material you would make 5,000 solid, and yet make a brick that will make a better wall. Ask your Masons. This saving will nearly pay labor cost.

YOU SAVE—cost of lumber for pallets by removing brick from the machine on the level ground, or any level surface.

BUT, IF—pallets are used, **NO BROKEN BRICK. REASON**, you remove brick **LENGTHWISE** of **PALLET** (see illustration) instead of crosswise. **ASK** those **WHY** who have had experience in removing brick out crosswise of pallet.

ANY SHAPE—brick can be made. **THE "LITTLE GIANT"** will make you money at every turn.

BIG THINGS—to look at if you are in the market for a brick machine. You ARE done experimenting when you buy a "LITTLE GIANT."

LA GRANGE SPECIALTY COMPANY,

::

::

LA GRANGE, INDIANA

THE MISSING LINK IN SILO AND TANK

CONSTRUCTION

PERMANENT As Concrete; CHEAPER Than Wood

EVERY SILO USER AND EVERY SILO MANUFACTURER has been looking for the SILO that will preserve silage as perfectly as the Wooden Stave Silo and will be as durable as the Solid Concrete Silo.

THE PLAYFORD PATENT CEMENT STAVE SILO

has been tested for eight years and has never failed. It has proven to be the

MOST DURABLE and CHEAPEST SILO ON EARTH

*Never Cracks Never Shrinks Nor Swells
Never Blows Down Never Burns
Never Decays*

THE FIRST COST IS LESS THAN THE COST OF THE WOODEN SILO

and

THE FIRST COST IS THE TOTAL COST.

Where the PLAYFORD PATENT CEMENT STAVE SILO has been used in SILO and TANK construction the Farmer will use no other material or method of construction.

Let us prove it to you.

Having secured the exclusive control of the RAMMER-PLAYFORD CEMENT STAVE MACHINE we are offering EVERY CEMENT MAN the opportunity of securing his local trade in SILOS, TANKS, STANDPIPES, CULVERTS, WELL-CURBING, etc.

Write us for full particulars and for terms on our CEMENT STAVE MACHINES.

CEMENT STAVE SILO CO.

DES MOINES, IOWA.

\$1,000,000

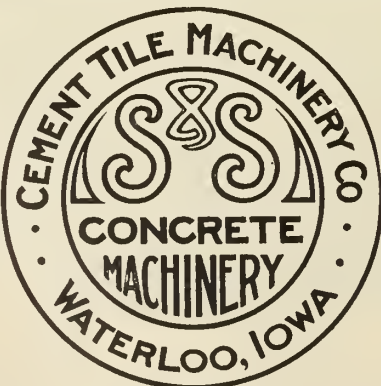
The great poultry industry of our present day is generally referred to as the Billion Dollar Industry. These figures are based upon the census as prepared by the United States Department of Agriculture at Washington, D. C. The production of poultry and eggs, therefore, must be reckoned as one of the foremost money-making pursuits. For twenty-two years

FARM POULTRY

the leading publication devoted to profitable poultry keeping, has been teaching everything worth knowing about the most successful ways and methods of Incubating, Brooding, Rearing, Feeding, Housing, Mating, Exhibiting, Killing, Dressing and Marketing of poultry for greatest profit. Professors of Poultry Husbandry at the leading Agricultural Colleges and Experiment Stations recommend FARM POULTRY as the sanest, safest and most reliable poultry paper published. Issued on the first of every month, and subscription price is but 50 cents per year. Price to Canada, 65 cents per year. Foreign countries, 75 cents. A sample copy is free.

FARM-POULTRY PUB. CO.,
Boston, Mass.

**"CONCRETE" LINER ADS
COST LITTLE
THEY SELL THE GOODS**



WHEN YOU NEED

Tile Machinery
Concrete Mixers
Block Machines
Brick Machines
Post Machines
Tile Molds
Wheel Barrows

Sand Screens
Sand Elevators
Stone Crushers
Steam Shovels
Gasoline Engines
Dump Wagons
Ornamental Molds

Industrial Cars
Steam Boilers
Friction Hoists
Sand Washers
Cement Tools
Side Walk Forms
Culvert Forms

Write us for literature and prices for we are sure that the S. & S. Line will please you. We make a specialty of equipping concrete product plants complete and can furnish you with anything from a short handled shovel to the complete plant.

The Cement Tile Machinery Company

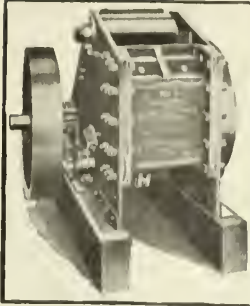
985-90 Rath Street

--

WATERLOO, IOWA

The Secret of Service
is good materials and
proper construction.

Champion Rock Crusher



The Champion Crusher is a serviceable crusher. It's built of STEEL and made RIGHT.

Why not do your own crushing? Your material will cost you less and you'll have it on hand when you need it.

The Champion Crusher is a good machine, but it's not costly. Made in small as well as large sizes. Mounted on wheels if you want it that way so that it can be easily moved.

Our crusher catalogue will interest you. It won't cost you anything whether you buy a crusher or not. We make screens, elevators, conveyors, rock drills, anything you may need.

The Good Roads Machinery Co.
KENNETT SQUARE, PA.

Write for
our
catalogue
now.
You should
have it.

For all Concrete Surfaces
perfect waterproofing
unlimited decorative effects

Driwal

Fills the pores without changing the surface texture. Equally adapted to new or old work. Made in White, Black, Transparent, and Fourteen Beautiful Flat Colors. And it's

Water, Weather, Acid and Alkali Proof

Send for Illustrated Booklet on Methods and Costs of Concrete Waterproofing and Decorating.

Bilchaco Cement Floor Coating, six colors, prevents dusting, saves wear, and protects cement floors from oil stains.

The Billings-Chapin Co.
Boston Cleveland New York

CRUSHED WHITE STONE AND MARBLEDUST

USE IN YOUR WORK

Adds Little to Cost --- Increases the Profits

Livens up Cement Work, Improves Appearance of concrete blocks, bricks and all concrete products; adds to looks of Stucco and is unsurpassed for brilliant Floor Finishes; Unexcelled for white plastering and exterior plastering.

We are prepared to furnish **prompt shipment** and **perfectly crushed materials** at a short notice.

Send for sample of our material and let us quote you prices.

Established 1903

Conlin & Co.

**TUCKAHOE,
N. Y.**

SALESMEN WANTED

Salesmen who call upon architects, builders, contractors, engineers—upon **anyone** interested in construction work—can carry a small sideline that will not only show a profit but will help their regular work.

All I want you to do is to carry in your grip a current number of this magazine, CONCRETE. You'll find that the people you call on are interested in a live journal on concrete construction. If you can take a man's subscription order you help him, you place reliable data in his hands, thus helping your firm, and you make a commission for yourself.

Here's another point—a copy of a magazine like CONCRETE will many times help you to interest your prospect in your line of goods. He may have seen the paper. He may have not. In any event, he is likely to be interested. Many salesmen who act as our agents find that the paper actually helps them get the conversation running where they want it. It helps them sometimes to land business for their main line. And they make a cash commission on every subscription taken.

Don't turn away from this advertisement—drop me a line right now, and let me tell you in figures just what my proposition is.

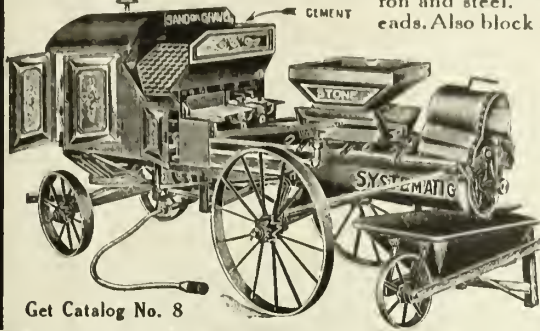
Circulation Manager

Concrete Pub. Co.

Detroit, Mich.

Systematic Concrete and Mortar Mixers ^{11 1/2} 6 Styles ^{11 1/2} 6 Sizes

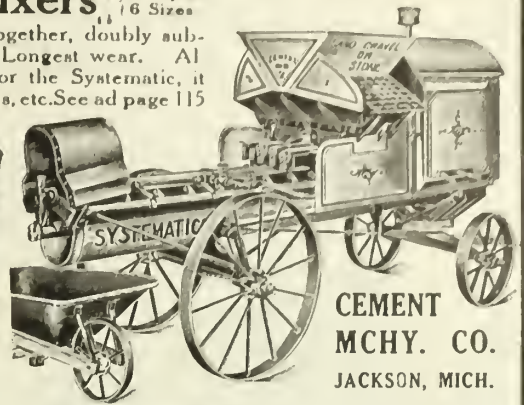
28 Exclusive advantages, per catalog No. 8—built with 2, 3 or 4 hoppers together, doubly substantial, no springs, chains or sprockets. Longest wear. All iron and steel. There's no substitute for the Systematic, it ends. Also block and brick machines, molds, etc. See ad page 115



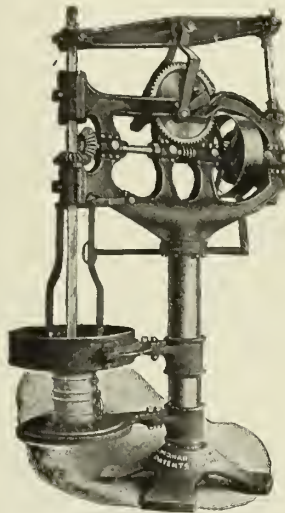
Get Catalog No. 8



The seal of satisfaction from thousands of users



CEMENT
MCHY. CO.
JACKSON, MICH.



THE Big Cement Tile Plants

where men of affairs are in charge are the ones that have shown their appreciation of the

MONARCH Tile Machine

No Man Knows So Much About His Own Business

that he cannot pick up some good pointers from others in the game. That's one of the reasons we are selling our machine and supplies to the big plants.

Start right and with proper management your success is assured, but don't delay sending for our catalogue—it tell you about the new principles we introduce in tile machine construction.

Monarch Machinery Mfg. Co.

777 Cedar Street,

Onawa, Iowa, U. S. A.

THE "D & A" SIX MOLD SIZE CEMENT FENCE POST MACHINE



NET PRICE

\$26.25

complete, with either 7', 7 1/2' or 8' length molds.

A profitable investment for any Cement Products Plant. One sack Cement, 1/6 yd. gravel, 12 lbs. steel and 3/4 hour labor will make six posts, at a cost of less than 16c each. Also made in 10 mold size.

"D&A" Molds are in use in all parts of the U. S., and many foreign countries. Eleven Ry. Co.'s, U. S. Dept. of Agr., and Dep't. of War.

The "Shaking System" which makes them Wet (not slush), no pallets, no tamping. "D&A" Tie Wires fasten fences securely and most cheaply.

New 1911-12 Catalogue ready since Nos. 1st, profusely illustrated and explains construction and operation of the "D&A" Molds in detail. It's Free. Send now for prices and discounts.

Save 25 per cent by buying a "D&A" Post Machine now.

D. & A. POST MOLD CO.

THREE RIVERS, MICH., U. S. A. - No. 210 THIRD AVE.

MONTROSS METAL SHINGLES



Fire-Lightning-and Storm Proof

Our Agents Are All Busy in the Spring

March, April and May are the busy months for the roofing contractor, the builder, the jobbing carpenter.

BECOME OUR AGENT—SELL MONTROSS METAL SHINGLES

Include the Roofing Job in your bid and clean up extra commissions for yourself. You'll be pleased—so will your customer. He'll be getting a better shingle at a lower price than he could get elsewhere.

Montross Metal Shingles are best made. Last life of building. Patent side lock allows for expansion and contraction. Won't leak, crack, rattle or blow off. Easy laid—no soldering.

Send for our proposition, illustrated catalogue, price list, testimonials, etc.

MONTROSS METAL SHINGLE CO.,

104 Erie St., CANTON, N. J.

"The Montross 'Eastlake' Shingles purchased for our church in 1889 make a good roof; not a cent for repairs since, with the exception of some paint." — J. A. Stillman, Tidoute, Pa.

GENUINE BANGOR

Roofing Slate, Structural Slate, Blackboards

EAST BANGOR CONSOLIDATED SLATE CO.

EAST BANGOR, PA.

Large Facilities

Prompt Deliveries

Experienced Tile Men

who are already in the cement tile business and have tile machines of other makes are buying more

McCracken Tile Machines

than we are selling to customers who are just starting in the business. Now the question for you to decide is this: Are you a better judge of what a successful tile machine should be than the fellow who has had the experience?

Twenty-seven of the last 49 McCracken Tile Machines we have sold were sold to people who already had other makes of machines.

This Proves Two Things

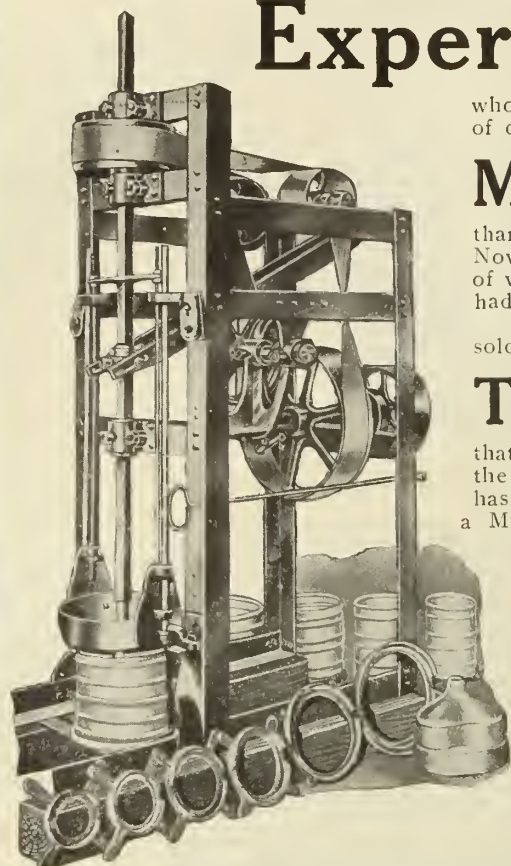
that the man with experience can see where it pays him to go to the additional expense of buying a McCracken, although he already has a machine, and that you are a better prospective customer for a McCracken machine after you have bought any other make of machine and used it for a time than you are right now before you buy any machine. Now if we are selling more machines to the people who already have machines than we are to new customers, it might pay you to buy a McCracken machine right on the start and have to buy but once.

Write for our Proposition.

Sioux City Cement Machinery Co.

West Fourth and Perry Sts.

SIoux CITY, IA.



For Securing Wood Forms

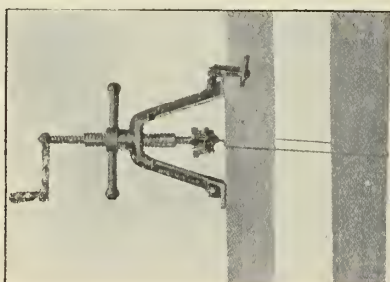
Milwaukee Wire Tightener and Twister.

Why use cumbersome clamps or drive your lumber full of spikes? Hold your forms in place by wire on the outside. Tighten it—fasten it in place—with our Wire Tightener. When concrete is set, cut the wire and your timber is good as new.

This tool will pay for itself on the first job. Ask for circular and prices.

The Milwaukee Device Company

1287 National Ave., Milwaukee, Wis.



"WORLD BEATER" BLOCK MACHINE

Fast, positive, accurate. Mold box and cores controlled by foot levers. Makes solid or hollow blocks, water-table, column, silo and porch blocks. Pallets cast with handles — no carriers needed. Write for new catalog.

U. S. Gas Machine Co.

Muskegon, Mich.



In the above cut of our

Practical Double Acting Press and Mounted Molds

for the manufacture of Concrete Block and Brick, the Press is shown open, and the Mold Box turned on the tipping table and Box open for removal of product. This machine will make Block and Brick at same time, without interference, and is a guaranteed **COST REDUCER**, that will enable you to meet any kind of competition.

Owing to our inability to buy a satisfactory machine of this class some three years since, we concluded to build one to suit us, rather than to buy a makeshift.

After a tryout covering two years this machine has made good beyond our expectations.

Capacity from 200 to 2,000 Block, or Brick in proportion, and will fit in any size plant.

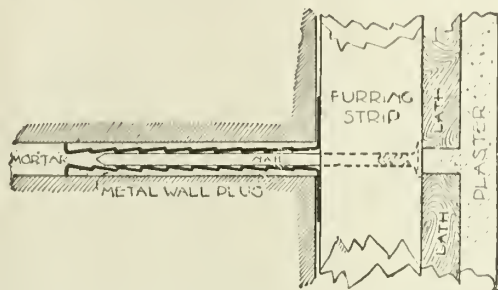
Inquiries solicited.

Practical Pressed Stone Co., Terre Haute, Ind.

In writing Advertisers please mention CONCRETE.

Just the 'Thing'

For
Securing Interior Finish



Furring Out on Brick or Concrete
Use the Standard

RUTTY METAL WALL PLUG

Send for Cement Booklet No. 94

J. B. Prescott & Son, Mfrs.

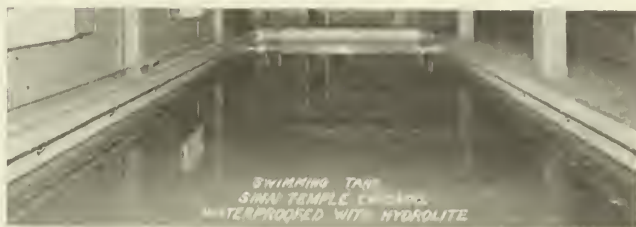
Dept. C

Agencies All Cities.

Woburn, Mass.

WATERPROOFING

By the
HYDROLITHIC SYSTEM
Promotes the efficiency of
PORTLAND CEMENTS
we
GUARANTEE
that it



- (1) Increases Colloidal Yield.
- (2) Increases Tensile and Crushing Resistances.
- (3) Increases the Density of Concrete and Mortar.
- (4) Decreases voids and porosities.
- (5) Decreases action of free lime.
- (6) Decreases tendencies of Portlands to crack.
- (7) Decreases cost of mixing for Waterproofing.

WRITE FOR BOOKLET.

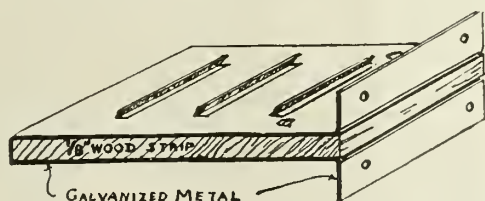
Good Products Company

1705 W. Austin Avenue
CHICAGO

The Vital ?

How do you manage
without

"The Common Sense Wall Plug"



"The Common Sense Wall Plug"

If it's good enough for Uncle Sam and Father Knickerbocker, it's good enough for you.

It's a Good Plug for Good Work

Let's get acquainted for your profit. Sample free

THE M. O. WICKS MFG. CO.

48 NASSAU AVE.

GLEN COVE, N. Y.



Trade Mark
Reg. U. S. Pat. Off.

Protect Your Concrete With Bay State Brick and Cement Coating

It is being specified by the leading architects and contractors not only as a coating on cement, stucco, and brick surfaces to protect them against moisture, but on high grade interior work on both wood and plaster.

When you need a coating for cement and want something that will stand up and give protection and durability, also a pleasing finish, use the BAY STATE BRICK AND CEMENT COATING, which is the result of research and experimental work for concrete, wood or plaster, it stands up better than any other.

You know how necessary it is to protect concrete surfaces against dampness. My coating is damp-proof and gives a pleasing appearance without destroying the texture of concrete and in addition is a fire retarder.

Write for particulars about BAY STATE BRICK AND CEMENT COATING. Address for booklet No. 12.

Wadsworth, Howland & Co., Inc.,

Paint and Varnish Makers and Lead Corroders
82-84 Washington Street Boston, Mass.

WAINWRIGHT GALVANIZED STEEL CORNER BAR

FOR PROTECTING EDGES OF CONCRETE CURBS, STEPS, COLUMNS, ETC.

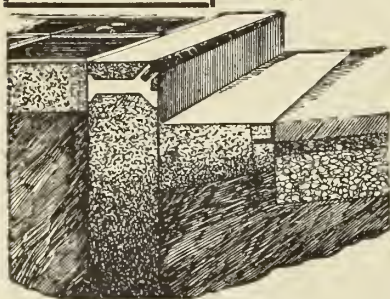
"Wainwright
Patents."

March 9, 1897
Nov. 22, 1898
May 5, 1903
March 26, 1907
August 29, 1907
August 2, 1910

THE BAR WITH A FOURTEEN YEAR RECORD

THIS BAR IS SELF-ANCHORING, THE DOVETAILED WEB HOLDING IT FIRM IN PLACE EVERY INCH OF ITS LENGTH, PRESENTING A RESISTING DEPTH OF TWO INCHES OF SOLID STEEL, AT EVERY POSSIBLE POINT OF IMPACT.

This bar has been in public use for more than fourteen years as the main feature of the



WAINWRIGHT STEEL-BOUND CONCRETE CURB

ABSOLUTELY NON-BREAKABLE
CHEAPER THAN GRANITE



GALVANIZED STEEL CORNER BAR prevents Chipping or Breaking on Edges.
MECHANICALLY PERFECT AND UNEQUALLED FOR CURVED CORNERS.

OVER FOUR MILLION FEET IN USE IN MORE THAN FOUR HUNDRED CITIES IN THE UNITED STATES

THIS CURB WILL STAND HARDER USE AND LAST TEN TIMES AS LONG AS PLAIN CONCRETE CURBING

CONTRACTORS can make money by laying this curb. CITY ENGINEERS can save money by specifying it.
ARCHITECTS are invited to read pages 238 and 239 "Sweet's Index."

METAL PARTS FOR SALE. SEND FOR COPYRIGHTED BOOKLET NO. 2.

STEEL PROTECTED CONCRETE CO., Real Estate Trust Bldg. PHILADELPHIA, PA.

Vaughan's Patent Concrete Spade

A Tool for Finishing Concrete Walls

**IT PAYS FOR ITSELF
IN A DAY'S WORK.**

By use of Vaughan's Patent Concrete Spade, you can force the coarse aggregates in the concrete back, while the forms are still about the wall, and let the finer cement mortar flow forward, the perforations in the spade allowing it to come to the front. Your wall is thus given a smooth finish, without applying face mortars.

Manufactured only by

J. H. CLARK

Manufacturer of and
Dealer in

CONTRACTORS TOOLS
AND SUPPLIES

137-139 W. Lake St., Chicago



The "Kent" Precision Mixer

It is a well built concrete mixing machine, built on scientific principles. It measures and proportions materials accurately and delivers mixed concrete at lowest cost. Get our mixer catalog. Ask about the "Kent" Mortar Mixer.



Address our home office or the following representatives

Kent Machine Co.

310 N. Water St. Kent, Ohio

J. F. Davis & Co., Kansas City, Mo.
Dodge & Dodge, 1133 Broadway, New York.
M. G. Dennison & Co., 144 Cutler Bldg., Rochester
Wm. Pattison Supply Co., Cleveland, O.
Sanford Concrete Machinery Co., Toledo, O. The W.
E. Austin Co., 2 Spring St., Atlanta, Ga. New Orleans,
Houston, Dallas, Oklahoma City, Memphis, Roanoke and
Norfolk. The Beebe Co., Portland, Oregon.



UNITED STEEL SASH Daylight Interior, Main Bldg. (300' x 1050') Edw. Ford Plate Glass Co., Rossford, O. DeVore-McGormley Co., Engrs.
Over one million square feet of HY-RIB Roofs in this Plant.

Daylight-Fireproof Factories at Low Cost

Buildings constructed of HY-RIB Concrete and UNITED STEEL SASH are permanent, fireproof, full of daylight, sanitary and economical.

HY-RIB Concrete makes a monolithic structure more economical than brick or wood. HY-RIB is a Steel Sheathing with deep stiffening ribs, a combined unit of reinforcement, centering, studs and lath for concrete and plaster work. Does away entirely with wood forms and expensive equipment.



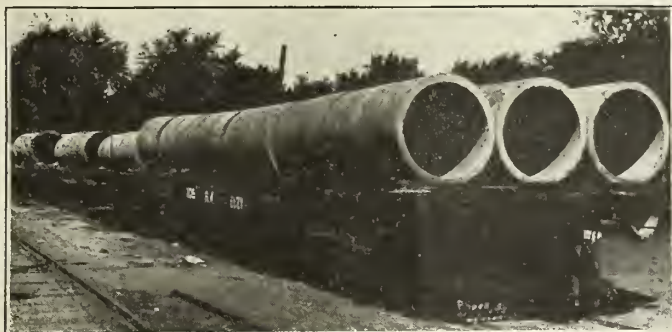
UNITED STEEL SASH Makes Interiors Bright as Day, bringing into usefulness every foot of space and assuring full efficiency of employees. UNITED STEEL SASH is made of solid steel sections unweakened by cutting or punching, and has large ventilators with double contact joints to shut out drafts and storms.

Are You Going to Build?

Our catalogues and suggestions will show you how to save time, money and trouble. Sent FREE if you write us about your building.

TRUSSED CONCRETE STEEL CO.,

850 TRUSSED CONCRETE BUILDING
DETROIT, MICHIGAN



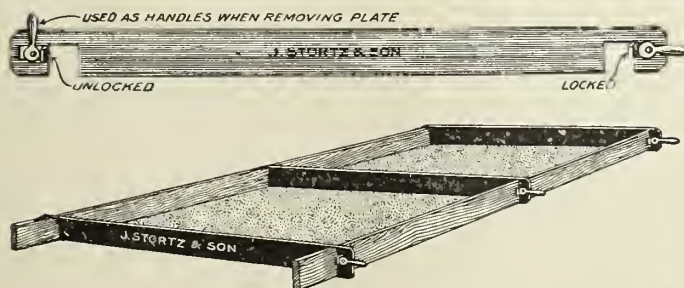
Big Money in Big Tile

The National Tile Machine

Makes tile 14" to 36" in diameter or larger if desired up to 48"—24" or 36" long. The demand for big cement tile is increasing and there's a good paying profit in their manufacture. Get into the BIG business class by establishing a plant for BIG tile. Tile made on the National Machine are tamped hard—they are dense and strong—they interest engineers and highway officials. Write us for BIG tile information.

Quinn Wire and Iron Works

E 12th St., Boone, Ia.



EXPANSION JOINT PLATES & FORM HOLDERS

No nails, no stakes, no braces, plates clamp securely to side forms, holding them in position. Perfect expansion joints produced. You save money on the cost of the work and you produce a better job. Ask for catalogue including 150 sidewalk making tools.

John Stortz & Son

PHILADELPHIA, PA.

220-222 Vine St.



CHASE CARS

for handling
Block, Brick,
Tile,
Sand, Gravel,
Stone, etc.

WE MANUFACTURE A COMPLETE LINE

of cars for all purposes, in the plant or on the construction job. Write for Catalog.

The Chase Foundry & Mfg. Co.

Columbus, O.

Liner Advertisements

Notes for these columns: Three cents per word per insertion, payable in advance. Copy can be accepted as late as the First of any month for that issue.

WANTED--Machinery

WANT TO BUY SECOND-HAND POWER tile machine. Roy Terry, Box 325, Lincoln, Ill.

WANTED--CONCRETE HEN NEST MACHINE, S & S preferred. Must be good and cheap. Address James Akeley, Greenville, N. Y.

WANTED -- GOOD SECOND-HAND Brick Machine and Sill and Cap Moulds. Address Lock Box 24, Big Run, Pa.

FOR SALE--Machinery

SACRIFICE SALE -- ONE WINGET Block Machine; Chicago Side Walk Block Machine; two Jackson Brick Machines; all in good condition. Prices 50% of original cost. Wm. Morgan, Williamston, Pa.

FOR SALE -- ANCHOR BUILDING Block Machine; Adjustable Steel Culvert Core; cheap. Will trade for Continuous Mixer. Geo. K. Edwards, Granite City, Ill.

FOR SALE CHEAP--FOOTE LEADER Block Machine; Dunn Sill Machine; Iron Pallets; Face and End Plates; Screens, etc. For particulars, address Andrew Bloomfield, Monroe, Mich.

MAKE A GOOD BLOCK MACHINE FOR about fifty cents. Illustrated directions, fifty cents. Have for sale the best brick and block machines cheap. William Barten, Gordon, Nebraska.

FOR SALE -- WRITE WETTLAUER Bros., Buffalo, N. Y., for their Catalog with new plan of selling at bottom prices on Mixers and Brick Machines.

BLOCK MACHINES FOR BUILDING Double Wall Frost Proof Concrete Silos. Address, J. J. Coyne, Fond du Lac, Wis.

POSITIONS WANTED

CIVIL ENGINEER, THIRTY, AT Present City Engineer in middle western city; extensive experience in designing and supervision of highway, pavement, sewer and general municipal construction. Three years' selling experience. Desire connection with Contractor or Manufacturer where there is an opportunity for advancement. Best of references. Box 113, c/o Concrete, Detroit, Mich.

AGENTS WANTED

AGENTS WANTED TO HANDLE UP-to-date block machines. No agents need apply who handle any other block machine. Good proposition for the right man. Cherry Valley Iron Works, Monroe, Wash.

DEXTER Portland Cement

THE NEW STANDARD

Sole Agents **SAMUEL H. FRENCH & CO.** Philadelphia



BUSINESS OPPORTUNITIES

FOR SALE OR TRADE--COMPLETE Concrete Tile and Block Plant, boiler, engine, piping, shafting, Schenck Tile Machine, Kramer Tamper, 4 block machines and pallets, small tools and accessories, 2 mixers; building 60x100. Good yard on sidetrack with sand close. Trade established and paying, but owners interested in other lines and wish to sell to practical man. \$14,000 plant will be sold cheap. Box 263, Ottumwa, Iowa.

RETAIL LUMBER BUSINESS. YARDS and Mill in growing town, with Branch Yard in an adjoining town. Only yards in this territory. In heart of Eastern Ohio Coal Fields. A First-class Business--a money maker. Good reasons for selling. Address, Retail Yards, c/o Concrete Publishing Co., Detroit, Mich.

Books on Concrete

Write for Free Catalogue

Concrete Publishing Co.,
DETROIT, MICH.

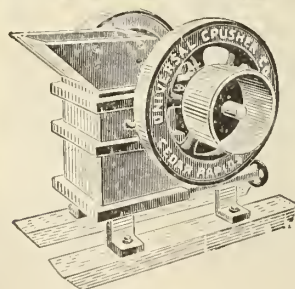
SPRUNK Engraving Co.



SALESMEN WANTED

See Advertisement on

PAGE 108



Try this UNIVERSAL Crusher in your plant for 30 days

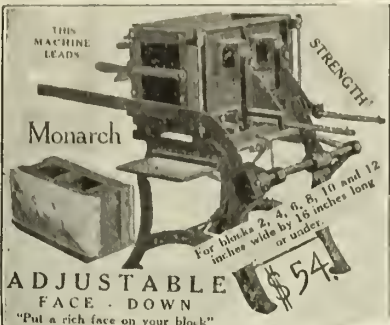
Our No. 2M has an opening $5\frac{1}{2}'' \times 12''$ when fitted for fine grinding, and $8'' \times 12''$ with the corrugated jaws for coarse crushing. It weighs 3000 lbs., takes 6 H. P. and will give from 20 to 50 tons in 10 hours, depending on how fine you want it.

This is certainly the machine for your Block or Tile plant, for your Gravel Pit, for handling the rejections in your Quarry, or for any place where uniform fine material is needed. Every machine is sold on a 30 days' trial to your heart's content—fair enough for any man. Send for our catalog.

UNIVERSAL CRUSHER COMPANY

33 B. Avenue
CEDAR RAPIDS, IOWA

Mr. Reader:--It will pay you to watch this page from month to month



THIS MACHINE LEADS
Monarch
ADJUSTABLE
FACE - DOWN
"Put a rich face on your block!"
For blocks 2, 4, 6, 8, 10 and 12 inches wide by 16 inches long or under. \$54.
Get catalog No. 8 for discounts. Our Systematic Mixer leads. See ad, page 109, this issue. **CEMENT MCHY. CO., Jackson, Mich.**



\$11.65 Buys The Mold for This Concrete Vase.
Diameter bowl 16 in.
Height of Vase 16 in.
This Rapid Concrete Vase Mold completes a vase every 12 minutes with only one man, at a cost of 17c. each. Built of heavy gray iron, carefully fitted and fully guaranteed. Prompt shipment. Four styles and sizes. Write today for circular of ornamental concrete molds.
A. A. HOUGHTON,
Dept. C, Northville, Mich.

For Building Concrete Steps
My adjustable form holders enable any man to set up forms for steps, one piece at a time. Every part of form true and square. Take form down one piece at a time. Saves time, labor and money. Patent applied for. Send for circular and prices.
H. L. PARK
Reading, Mass.

CHARLES E. SIMS Consulting Engineer
Worthington, Minnesota.
Cement drain tile factories designed. Detailed plans, specifications and cost for building and equipment. Proposed sites investigated.

Crushed Granite

Screened to size, for concrete or artificial stone. The strongest and most durable aggregate. Two colors, gray or white. Woodbury Gray Granite is mouse-gray in shade. Hardwick White Granite is the whitest granite known. In carlots, at a low price.

Let us quote you also on granite sills or trim for use with concrete work. Quick delivery.

WOODBURY GRANITE CO.,
Hardwick, Vermont.

Sanitoid Flooring

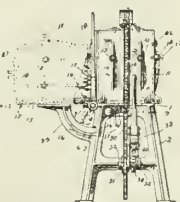
A Composition Mineral Substance laid in monolithic form and producing a fireproof, waterproof, permanent, and sanitary flooring base, or wainscot. Methods of installing SANITOID are simple and easily learned. Can be sold at good profits for a hundred different uses. Write for material costs and territory rights today.

The Sanitoid Products Co.
701 Brunson Bldg. COLUMBUS, O.

Block Machine Opportunity

Will sell patterns and patents or will lease manufacturing rights of Concrete Block Machine and Hand Lever Press. Makes block up to 16 in., any style, rapid, face down, wet mixture. None except buyers need apply. No agents wanted.

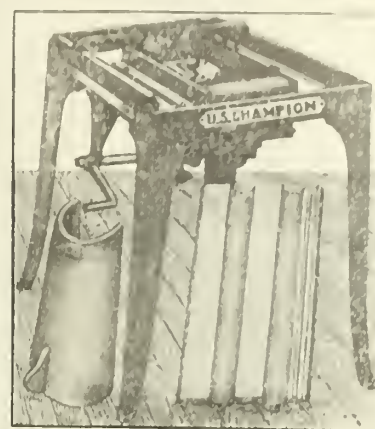
John Wengs,
506 First St.
Manroe, Mich.



Barten Process and Machine

For Making Concrete Building Blocks of a Slushy, Muddy Mix, also of a Moist mix. 1000 machines in one, and by far the lowest in price. Send for catalogue.

W. H. Barten, Gordon, Nebr.



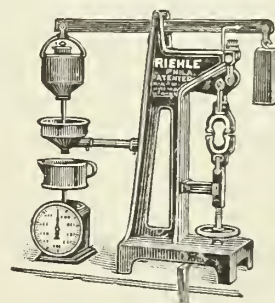
This Cement Roofing Tile Machine (Pat'd 1-12-07)
Is the only practical machine of its kind on the market. For durability and attractiveness, the U. S. Champion tile roof supercedes all others. It has no competition. Little investment. Big profit. Write for our new catalog.
L. Hansen & Co., 2036 Penn St., Kansas City, Mo.

For Sale

Fifteen 30" gauge, 40 cu. ft. square box rocker bottom Koppel Steel Tunnel Cars.
Twelve 30" gauge 27 cu. ft. Youngstown V-shape Concrete Cars.

No. 33 Chicago Improved Cube Mixers, Buckets, Crushers, Drills, Hoists, Pumps, Air Compressors, Cableways, Etc. Write

E. C. Sherwood
42 Church St., New York.



RIEHLE AUTOMATIC CEMENT TESTING MACHINE

Pat. Nov. 8, 1904.

Solid Back Grip

Pat. Sept. 11, 1900
Pat. June 10, 1904

Testing Outfit

1424 North 9th St., Philadelphia, Pa.

Mixers and Brick Machines

Write us for our catalog and new plan of selling mixers and brick machines at rock bottom prices.

Wetlaufer Bros.
Buffalo, N. Y.

Advertisers

To manufacturers of small specialties not profitably advertised in big space and manufacturers of heavy equipment who want to "feel out" this field we recommend the use of advertising space on this page. Advertising space here is given distinctive position, and will bring results. This rate is low because no large space is sold; you can keep your proposition before our readers the year 'round at little expense. No advertisement accepted to occupy more than 3 inches single column, on this page. Ask for rates.



Some Homespun Remarks About Concrete Machinery.

An old hoss trader named Dave Harum once said that a certain amount of fleas are good for a dog—they keep him from brooding on being a dog. That's the way with concrete machinery manufacturers—they have troubles that keep them from brooding.

I've had my share of difficulties. Five years ago some people said my notions about concrete were "fogey." Many of those notions I still have and the best concrete engineers have joined me. For instance, I don't believe that a block or a brick or any other concrete unit can be made dense and strong by pressure alone. I think you have to tamp the concrete into the mold—tamp it and churn it and tamp it again.

Another thing—I don't believe that a machine which delivers a certain amount of concrete into a mold every time and then tamps or presses that material to the size of the mold, makes a good product. I think you have to provide for a surplus of material—put more material into the mold than you can possibly use and then tamp it as hard and as fast as your machine will work. When you scrape off the surplus you are sure of having a unit tamped to maximum density.

My machines are built along these lines. I manufacture ten times as many machines as can be shown on this page. I show a few of them. Every machine I ship out is a first—I sell no seconds. I stand back of every machine I sell. After buying a machine of me if you're not satisfied, say so and we'll trade back.

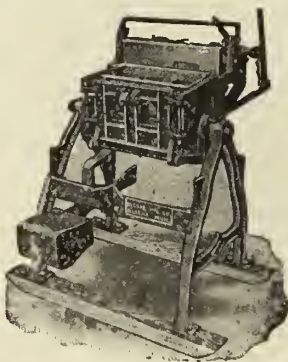
I like to hear from concrete men. Write me a letter. No matter what machine you need, ask me about it. I'd like to show you my machine for your purpose. Then you can decide whether you want to buy Besser equipment or not.

Don't wait until you actually need a new machine. Maybe you could make a change right now in your plant that would pay for itself in half a season and then show a profit. Let me hear from you.

Herman Besser,
President

BESSER

A block machine without a single lost motion



The Besser face-down block machine does what no other machine on the market will do—it makes block face-down, of wet mixture, at a speed that eclipses that of every other hand machine. With the machine ready, the facing is tamped onto the face-plate, cores are drawn in horizontally, balance of material is tamped in, block is turned over by touching a counter-weight, the cores are withdrawn vertically, the block is thrust forward toward the operator for removal, and the machine is in the same position in which it started. It's ready for making a new block—not a lost motion anywhere.

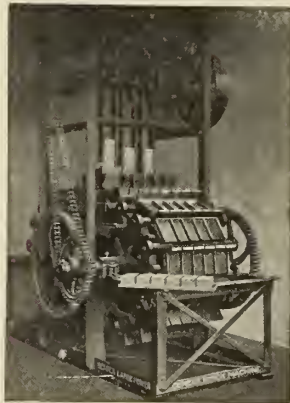
The Besser machine is the only machine made embodying these points. On it you can turn out the best class of block. You can use a wet mixture, because the cores withdraw vertically—the walls of the block can't sag.

Write for special block machine catalog.

The **BESSER POWER TAMPER** works over this block machine or any other block machine. It's worth investigating.

Mixers

Besser Simplified Continuous Mixers are built for plant work and for outside jobs. The mixer on skids hasn't a gear nor a chain, nor a sprocket nor a spring on it. The portable mixer on trucks has just one chain, the direct drive from the engine. If you want a mixer for any purpose, get the Besser Mixer Catalog.



Power Brick Machine

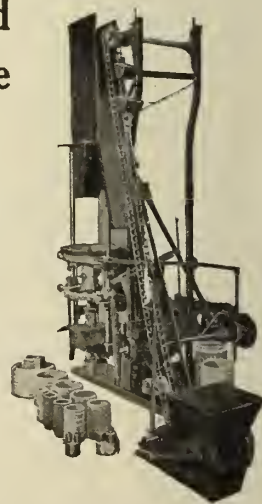
Makes 30,000 to 60,000 perfect brick per day. This isn't a small machine to operate as a side line, but a complete brick plant in itself, to compete with a clay brick plant. Brick are tamped into molds. Material and product handled automatically. Brings cost of brick down as low as \$4.00 per thousand. Ask for special catalog.

Drain and Sewer Tile Machines

Besser Tile equipment comprises every thing from a set of hand tile molds to a big machine that automatically tamps and finishes sewer tile as large as three feet across. This power sewer tile machine has four steel tampers that deliver 450 blows of 400 lbs. each, every minute.

The Besser Regular Drain Tile Machine (shown at the right) is the most modern type of drain tile machine. It feeds itself automatically, saving one man in your plant. Ask for special pipe and tile machine catalogs.

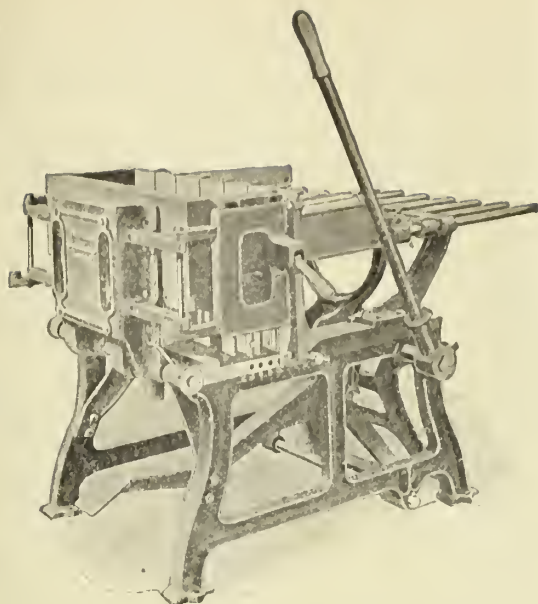
We issue 16 different catalogs. Tell us what kind of concrete machinery you want and we'll send special information about our line. Write today.



Besser Mfg. Co.

104 12th St. - - Alpena, Mich.

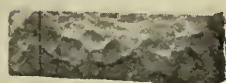
The first thing put into Besser Machines is QUALITY



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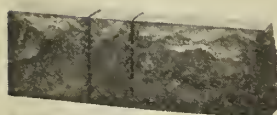
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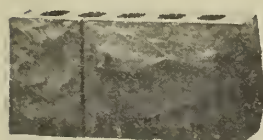
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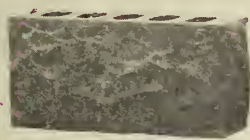
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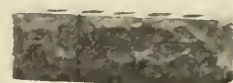
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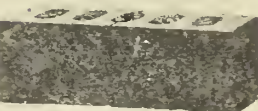
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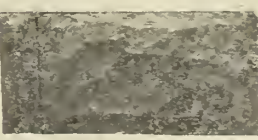
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16



17



18

HOBBS Block are attractive, they are clean-cut and true to size. Masons like to set them and builders prefer to buy them. 100% profit is not unusual with Hobbs customers, for Hobbs block sell at a premium. Ask for proof and we will gladly furnish it.

THE veneer and hollow block shown in border are all made with the regular Hobbs Machine. The block illustrated are 4, 8 and 12 inches in height. Each combination of fractional block was made with the Hobbs set up as a 24-inch machine. The Hobbs is also a regular 16 or 20-inch machine whichever you prefer. Over 2,000 distinct sizes of block can be made and there is no end to the styles and combinations you can make.

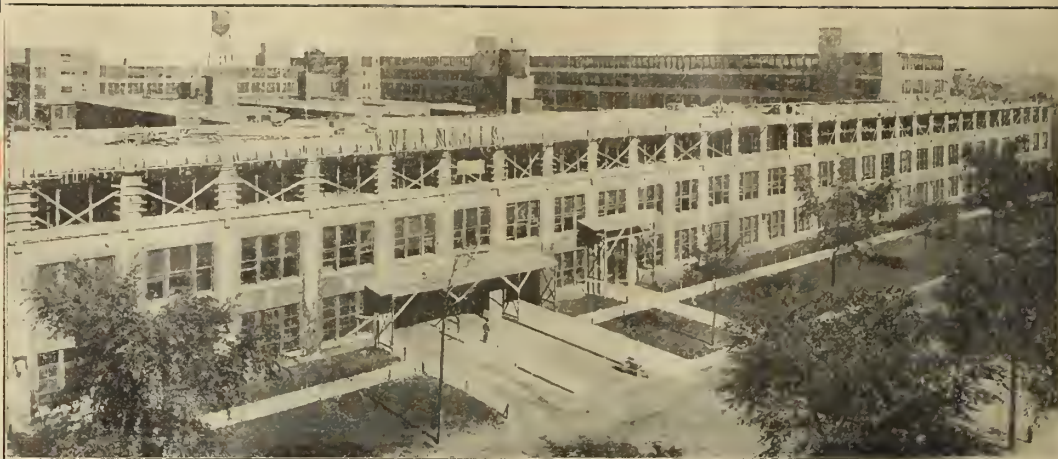
DON'T handicap yourself with a cheap or an old style machine. Make the most of your opportunities. Send for our catalog.

THE **H**OBBS **C**ONCRETE **M**ACHINERY **C**OMPANY

933 Scotten Avenue, Detroit, Mich.



Packard Motor Car Co.'s
Plant, Detroit, Mich.
Reinforced Concrete Building
500 Feet long, 60 feet wide
20,000 barrels PENIN-
SULAR PORTLAND
CEMENT USED in its
construction.



USE Wabash Portland Cement

Best for All Kinds of Concrete Work
Great Strength and Durability. Fine Color and Uniformity

Sold by the Best Dealers

Wabash Portland Cement Co.

Phone Main 859

1824 Ford Bldg., DETROIT

WOLVERINE PORTLAND CEMENT

More Than Nine Years of Satisfaction

Unxcelled for Strength and Uniformity

Manufactured by the

Wolverine Portland Cement Company

COLDWATER, MICHIGAN

Write for Prices and Booklet.

W. E. COBEAN, Sales Agent, COLDWATER,



Why you should buy our Cement

- It is exceptionally uniform in color.
- It is ground fine—over 96% passes a 100 mesh sieve.
- It is made under the COWHAM SYSTEM — a guarantee of worth.
- It is made in large quantities—on good railway connections—insuring prompt shipments.



Write for the Northwestern Prices

When you are in the market for cement give us a chance to figure with you. Our cement has great strength—you should use it, and if you will write us we are sure we can get together.

Write for Our Book on Cement.

Northwestern States Portland Cement Co.

(COWHAM SYSTEM)

Works and General Offices,
MASON CITY, IOWA,

U. S. A.

CONCRETE

VOLUME XII

MAY, 1912

NUMBER 5



Use "Chicago AA" Portland Cement

"THE BEST THAT CAN BE MADE"

Our booklet, descriptive of the "Chicago AA" process, is free to cement users. Write for a copy today.

CHICAGO PORTLAND CEMENT CO.,
Dept. 86, Chicago, Ill. J. U. C. McDANIEL, Sales Mgr

Present Output 1,500,000 barrels annually

ALPHA PORTLAND CEMENT

The Recognized Standard American Brand



A strictly straight Portland which for uniformity and general excellence cannot be surpassed. It is absolutely pure and unadulterated. Contains no furnace slag or other by-products.

BEST IN THE WORLD FOR SIDEWALKS
Write for our handsomely illustrated book, sent free.

ALPHA PORTLAND CEMENT CO.
5 Centre Square, Easton, Pa.

BRANCH OFFICES: Board of Trade Bldg., Boston; Hudson Terminal Bldg., New York; Builders' Exchange, Buffalo; Oliver Bldg., Pittsburgh; Marquette Bldg., Chicago; Harrison Bldg., Philadelphia; Builders' Exchange, Baltimore; National Bank Bldg., Savannah.

The Special Attention of
Steam Curing System
Users is called to an Editorial announcement on

Page 105

CONCRETE

"LEHIGH" PORTLAND CEMENT

Recommended for high-class engineering work. High tensile strength. Finely ground, light and uniform in color.

LEHIGH PORTLAND CEMENT CO.
Head Office, ALLENTOWN, PA.

Main Western Office: 521-532 Peoples Gas Building
CHICAGO, ILL.



THE BEST FOR ALL USES



**WM. G.
HARTRANFT
CEMENT
COMPANY**



Sole Selling
Agents

**PHILADELPHIA
PA.**

Real Estate Trust
Building



ILLUSTRATED CATALOGUE SHOWING WORK DONE WITH THESE CEMENTS SENT FREE UPON REQUEST

THIS MONTH

CONTRACTORS will be interested in a description of methods employed in the Brooklyn four-track subway construction and in an account of placing concrete under water at Louisville. **CONCRETE PRODUCTS MANUFACTURERS** will find food for thought in complete drawings and description of a new system of vapor curing.

Another article of unusual interest tells just how concrete lumber is made for **GREENHOUSE BENCH CONSTRUCTION** in a flower factory which uses 35 miles of benches.

CONCRETE PUBLISHING COMPANY

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DETROIT, MICH. ADVERTISERS' INDEX, PAGE 23

ONE DOLLAR A YEAR

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CONCRETE PUBLISHING CO.

FIFTEEN CENTS A COPY



Cheesman Memorial, Denver, Colo.
Marcan & Norton, Architects

Approximate Cost, \$100,000 00

MEDUSA WHITE PORTLAND CEMENT

USED FOR FOUNTAIN, WALL AND BALUSTRADES

WE ALSO MANUFACTURE

MEDUSA GRAY and WHITE WATERPROOFED CEMENTS

MEDUSA WATERPROOFING

WRITE FOR FREE ILLUSTRATED BOOKLET AND SAMPLES

SANDUSKY PORTLAND CEMENT CO.

SANDUSKY, OHIO



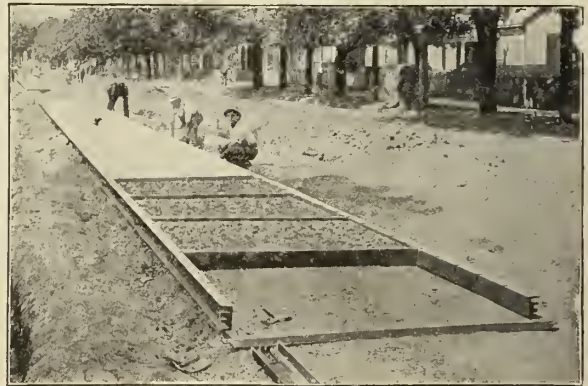
Blaw Steel Forms for Concrete Construction

The Blaw System practically eliminates the cost of form work in the construction of

CONCRETE HOUSES

Simplest, best and cheapest. Cannot build crooked walls. Blaw Forms require less than half the labor in handling that other forms require.

Complete steel form systems furnished for the largest as well as the smallest concrete buildings for every purpose.



Agents wanted in all parts of the country to sell Blaw Sidewalk Curb and Curb and Gutter Forms.

Blaw forms are designed from the contractors standpoint. They are light, rigid, quickly and easily handled, and will last a lifetime. The design is simple and the cost low. Our engineering department is at your service—tell us what your problem is.

Blaw Forms have been used on over 5000 Contracts

Sewer Centers	Pipe Molds	Aqueduct Centers	Tunnel Forms	Subway Forms
Shaft Forms	Wall Forms	Large Span Arch Ribs	Culvert Molds	
	Silo Forms	House Forms		

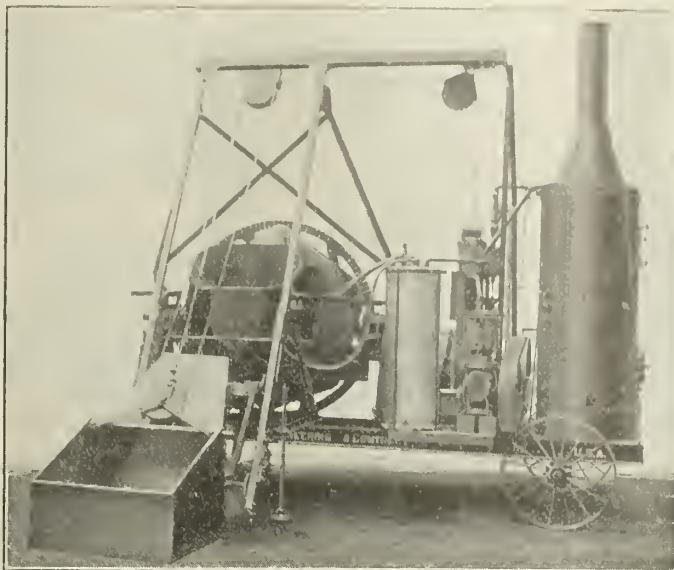
Architects—We are conducting a prize competition for the best designs for concrete residences. Write for particulars.

Blaw Steel Centering Company

New York—165 Broadway.

General Offices, Westinghouse Bldg., Pittsburgh, Pa.

Chicago—917 Ashland Block.



There are no buckets, wings or other contrivances on the inside of the cube. It is the shape of the drum that does the mixing.

The Austin Heating Attachment does not interfere in the slightest degree with the cube principle of mixing.

It simply makes hot the materials being mixed.

Heating with the Austin Hot Blast Heater supplies the one desirable requisite of high temperature desired under certain conditions without affecting in any way any requisite of scientific mixing.

Write for Catalogue No. 28.

Municipal Engineering & Contracting Co.

Main Office—Railway Exchange Building, Chicago.

New England Agents—Dyar Supply Co., 510 Main St., Cambridge, Boston.

Pittsburg—108 Parkway, N. S.

San Francisco Agents—The Lansing Co., 338 Brannan Street

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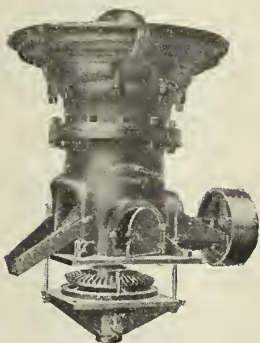
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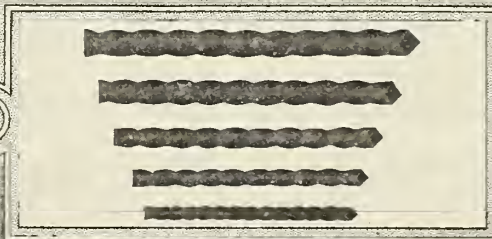
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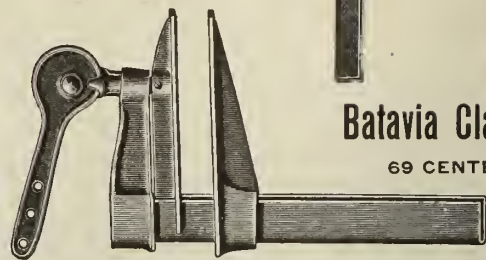
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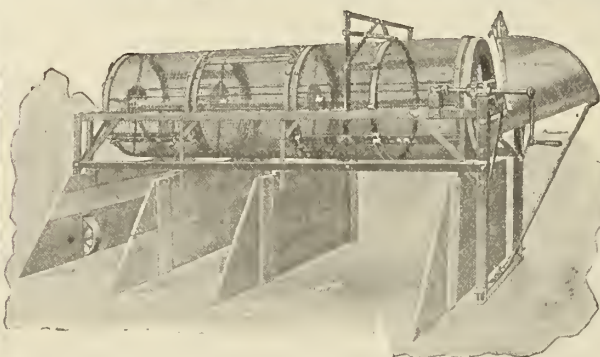


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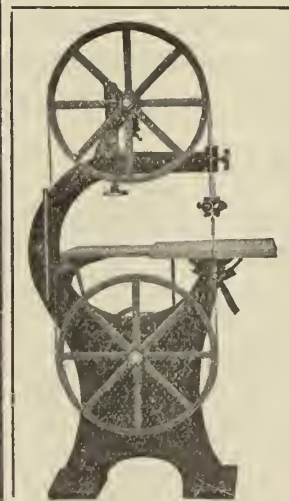
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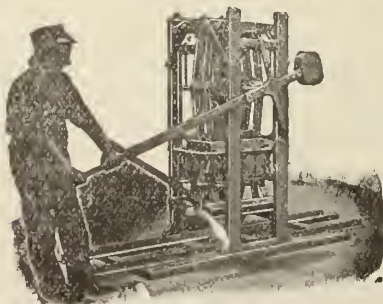
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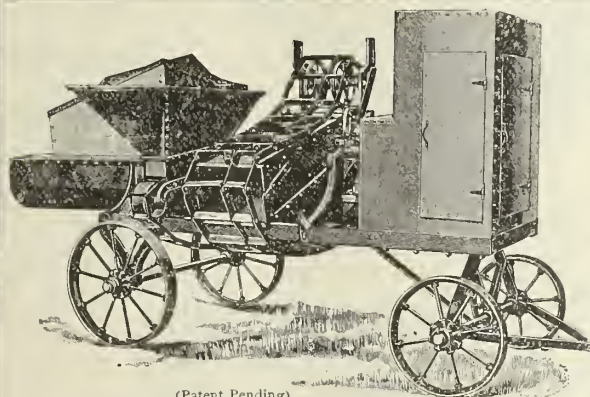
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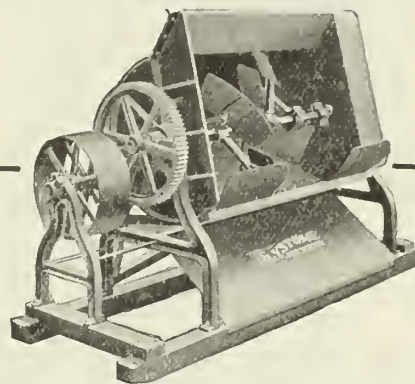
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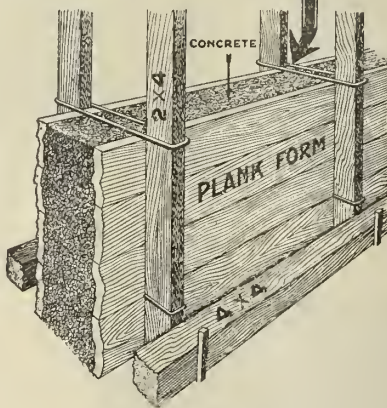
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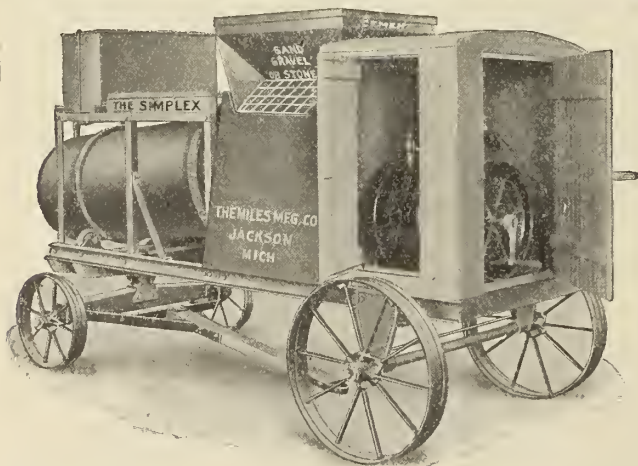
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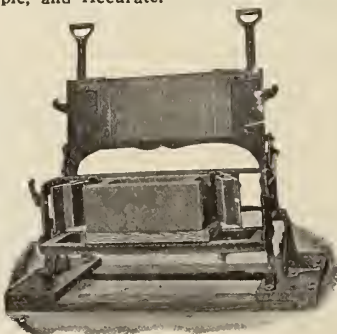
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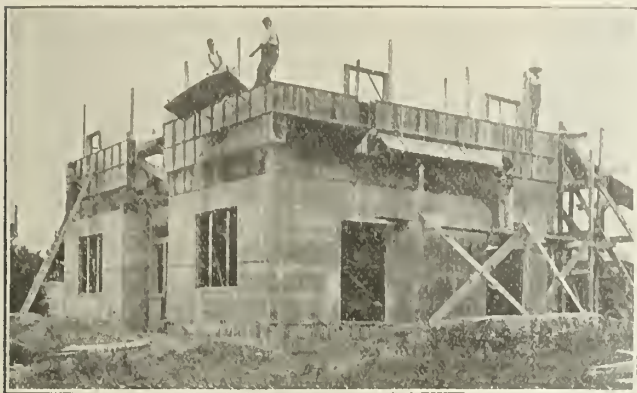
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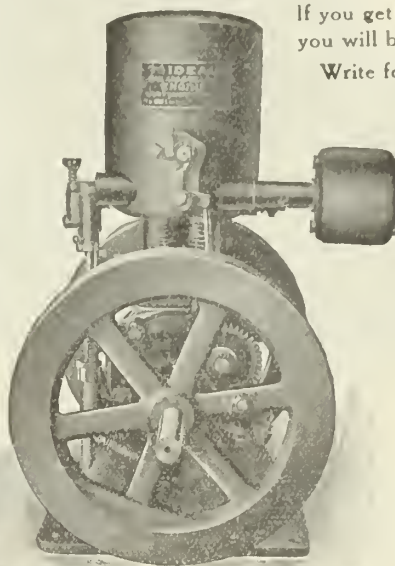
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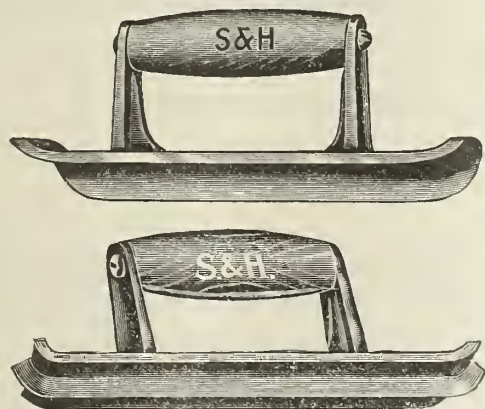
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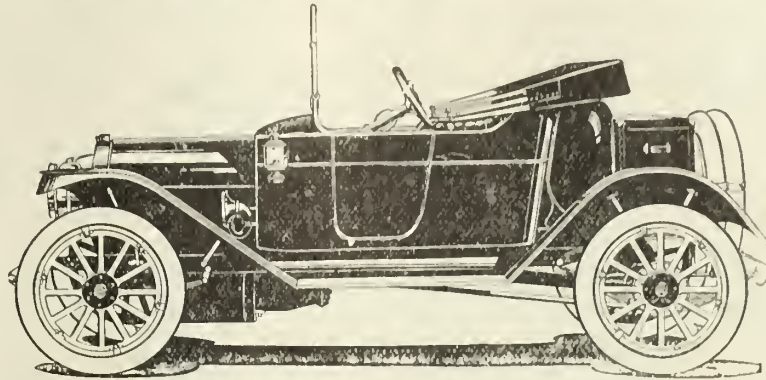
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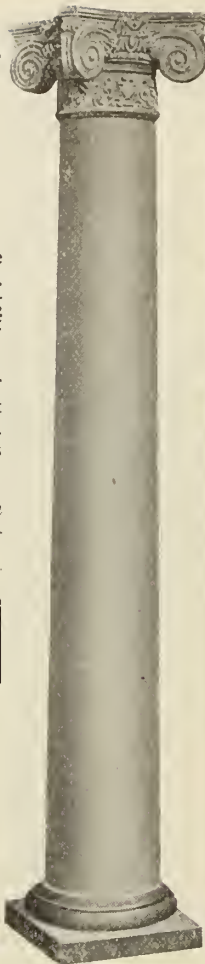
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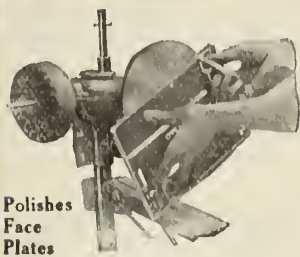
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30 DAYS FREE TRIAL

POLISHES FACE PLATES
SHARPENS ALL TOOLS

Takes but a few seconds to polish face plates smooth as glass—sharpens hatchets, saws, chisels, augers, plane bits and all other tools, in a few moments. Entire grinding outfit sent on free trial. No promises, no money needed, no red tape. Use it free for 30 days, and then, if you are not anxious to keep it, return it at our expense.

Luther Dimeo-Grit Tool Grinder

Dimeo-Grit, the newest artificial diamond abrasive, cuts hardest steel as emery does soft copper; 25 times faster than the grindstone, 10 times more efficient than emery—no need of cooling with water—no danger of drawing temper. Built all of iron and steel, enclosed shaft drive, dust-proof bearing, easily portable, foot and engine power. Extra attachments convert it into forge, jig and circle saws, drill, lathe, etc., giving full shop equipment at extremely low cost.

Write Today for 30 Day Free Trial Offer

Let us send you our 40 page free book, so you can select the outfit you would want for 30 days' free trial. It fully describes Luther grinders and reprints the story of artificial diamond abrasives from McClure's Mag. Write today.

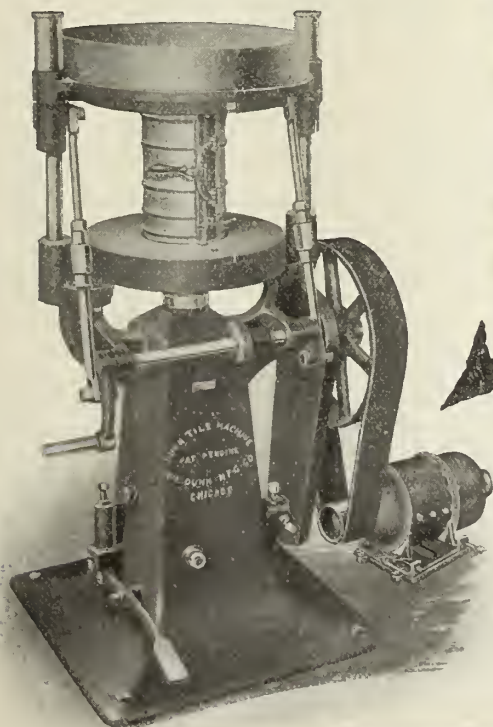
LUTHER GRINDER MFG. CO., 4130 Michigan Street, Milwaukee, Wis.



14 Machines in One

1—Fine Dimeo-Grit wheel. 2—Coarse Dimeo-Grit wheel. 3—Universal tool rest. 4—Chisel and plane bit guide. 5—Dimeo-Grit razor hone. 6—Dimeo-Grit scythe stone. 7—Dimeo-Grit saw gummer. 8—Felt polishing wheel. 9—Medium Dimeo-Grit wheel. 10—Cloth Buffing wheel. 11—Dimeo-Grit oil stone. 12—Dimeo-Grit pocket hone. 13M—Plane bit honing attachment. 14M—Twist drill sharpening attachment.

Let a Little Motor Run It



The Cheapest and Most Satisfactory Power to Use

is an electric motor. It delivers power when you want it, without trouble in starting it or keeping it running. It's reliable, efficient and low in cost. Operating machinery by power makes money for the owner, if power troubles don't eat up profits.

STERLING Electric Motors

are built especially for the kind of service required by building contractors and operators of concrete plants. Don't struggle along with hand power machines. Don't try to make the old power units serve—use the modern, dependable power unit, the electric motor.

Tell us what power you require, how you want to distribute it and what kind of electric current you have available—"direct" or "alternating." We'll tell you how large a motor you need, what it will cost you and what the power will cost per machine.

OHIO STERLING CO., Dayton, Ohio

Manufacturers of electric motors for concrete machinery.

IF all users of Concrete and Mortars would **JUST STOP AND THINK** of the great saving of labor and cement made through the use of **MIXERS** every user would be in possession of one, once interested. Users of Concrete and Mortar are discriminating more and more in favor of the

LANSING - ADVANCE

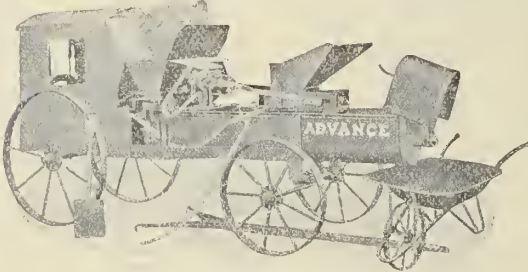


We want to tell of its many advantages and reasons for its growing popularity.

MORTAR MIXER

We carry these in stock at our warehouses named below.

Write for catalog J. M.



CONCRETE MIXER

LANSING COMPANY

Formerly Lansing Wheelbarrow Co.

37 Forest Ave., LANSING, MICH

WAREHOUSES:

New York, 102 No. Moore St. Chicago, 169 W. Lake St. Minneapolis, 330-4 No. First St.
Kansas City, 923 Mulberry St. Philadelphia, Willow and No. American Sts.
Boston, 78 Cambridge St. St. Paul, 51 E. Fourth St.



The Finger Ring Levels

The ideal tool for setting forms for concrete, laying cement block, raising leads and corners and topping out flues. These are only a few of the many uses the mechanic has for this level.

Buy one today and be convinced of the real merits and utility of this tool.

If not sold by your hardware dealer, write to us, giving name of your dealer, and get our beautiful illustrated booklet of "How Jack Finnigan Saved His Job."

THE KOKOMO LEVEL CO.

Kokomo, Ind.

General European Agents:

Lindenthal & Co., Berlin, Germany

Agents Great Britain:

The (U. K.) Winget Concrete Machine Co.,

Newcastle-on-Tyne, England

Asiatic Agents:

Joseph Edward & Co.,

Victoria Road, Karachi, India.

In ordering, please give measurement of finger



Level and Plumb Combined

Cement Pipe and Tile

By E. S. HANSON

NEW EDITION

NOW READY

A working manual from start to finish. Takes up in detail the location, design and equipment of plants, methods of manufacture, kinds of machines, amounts of materials, figures, on the cost of production at various points, little "kinks" which will aid in satisfactory and economical production, etc. It will endeavor to be so complete as to furnish an answer on almost any question which can arise with regard to this important branch of the concrete business. More space will be devoted than heretofore to matters pertaining to large pipe for transmission mains, sewers and the like, giving a considerable amount of data from various cities and other places where large pipe has been used. Sent prepaid for \$1.00.

The Cement Era Publishing Co.

Chicago

Cement Directory

1912 EDITION

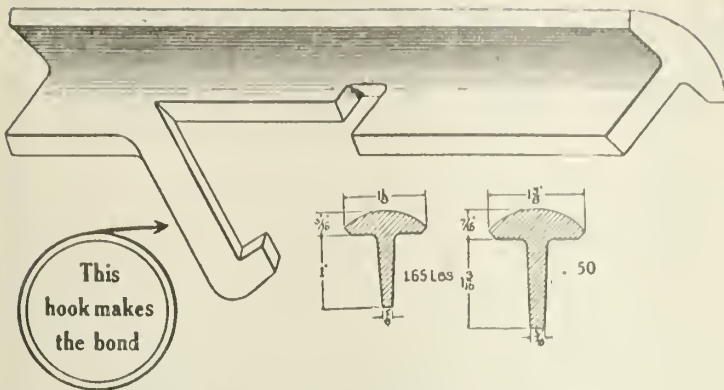
NOW READY

A thorough revision of the well known Directory of Portland Cement Manufacturers, together with Manufacturers of Gypsum and Lime, bringing down to date descriptions of manufacture, capacity, capitalization, accompanied by names of officers and superintendents, post-office addresses, a list of brands and a buyer's guide.

This directory stands alone. It has an established reputation of six years as reliable, up-to-date and authentic, complete, neat and handy. Is so useful and handy to anyone in these industries that it is almost indispensable. Order now for immediate delivery. Sent postpaid for \$1.00. Contains 250 pages, 3 x 5 inches, to fit the pocket; bound in black flexible leather covers; gilt edges.

The Directory of Port and Cement
Manufacturers

1207 Morton Bldg., - Chicago, Ill.



Protect and Reinforce the Corners of Your Concrete Curbing

City engineers and contractors who have had trouble with the old sandstone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear.



EBCO Hook Curb Bar

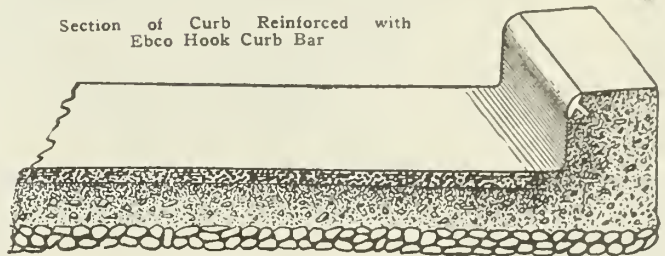
is a steel member to be embedded when the concrete is poured, forming a permanent protecting edge and acting as a reinforcing member as well.

These bars have shear members which bond perfectly with the concrete. Rolled in straight lengths and in curves for street corners. They come in 10 ft. lengths, seven anchors in each length. Write for circulars.

EDWARD E. BUHLER & COMPANY MANUFACTURERS

Sales Office: 103 Park Avenue - - - New York City
Factory: Pittsburg, Pa.
Western Agents: Waterhouse, Price Co., San Francisco, Cal.
Louisiana Agents: Standard Paving & Construction Co., 321 Godchaux Bldg., New Orleans, La.
New England Agents: Warner, Miller Co., New Haven, Conn.
Wilkesbarre: Ralph C. Hull, Wilkesbarre, Pa.
Milwaukee: The Contractors' Co-operative Co., Merrill Bldg., Milwaukee, Wis.
Canton and Akron, O.: Fred Fogarty, Akron, Ohio.
Montreal, Canada: Stinson-Reed Bldrs. Supply Co., Ltd., Montreal.
Baltimore, Md.: Hudson Cement & Supply Co.

Section of Curb Reinforced with EbcO Hook Curb Bar



Make Lower Bids—And Higher Profits BY USING OUR LONG HANDLED FINISHING TOOLS



One finisher can do several times as much work in a day as he can with hand tools; smoother work, too. Tools are equipped with long handles to enable operator remain standing at his work. Saves backaches and sore knees. Finisher trowels backward and forward across the walk. All the work may be performed from one side of the walk. Our patent device automatically tilts the edge of the trowel blade to prevent digging into the mortar.

SENT ON FREE TRIAL—No Cash in Advance

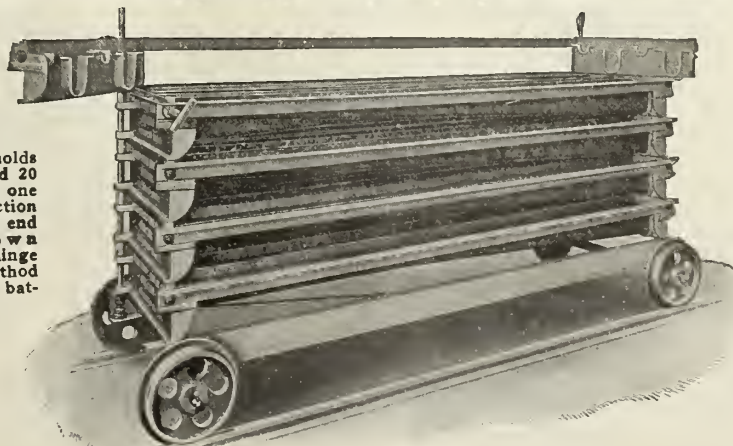
Any tool or complete set sent to any responsible contractor on 10 days' trial. No cash in advance. Try them on your own work before paying for them. We make trowels, jointers, edgers, floats, etc.

Free catalogue mailed on request—send in your postal today. Address

Twentieth Century Manufacturing Co.,

1650 LOWE ST., - - - CHICAGO HEIGHTS, ILL.

Batteries of molds making 30 and 20 wet posts at one time. Top section emptied and end frames thrown back on hinge showing method of emptying battery.



CONCRETE FENCE POSTS

T-Shape makes them

Strongest—Lightest -- Cheapest

Our molds and posts are used all over the world. Used by leading U. S. railroads and interurbans. We guarantee our molds absolutely. See our exhibit at the Kansas City Cement Show, March 14-21.

OHIO POST MOLD CO.

1341 Nicholas Bldg., Toledo, O.
Write for our catalog.

Labor is the Big Cost Item—How to Cut it Down

Whether you do general contracting work or operate a concrete plant, if you can cut down your crew by one man, it means about \$800 a year to you.

You can cut your labor costs by using labor-saving equipment—cars, barrows and trucks for handling raw material and finished product.

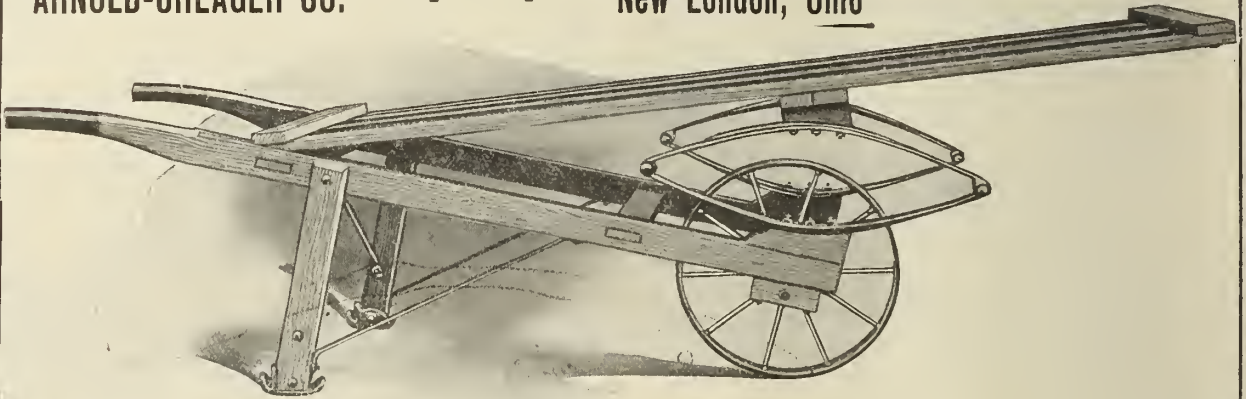
We manufacture a special line of trucks, cars and barrows for concrete men. We make barrows for sand, cement, gravel and mixed concrete—special spring barrows for green concrete products—barrows for pallets and face-plates—carts for materials—trucks for handling the cured product.

We show below our special two-wheeled spring barrow for handling green block, brick or tile in the plant. The same barrow is made with two wheels if desired.

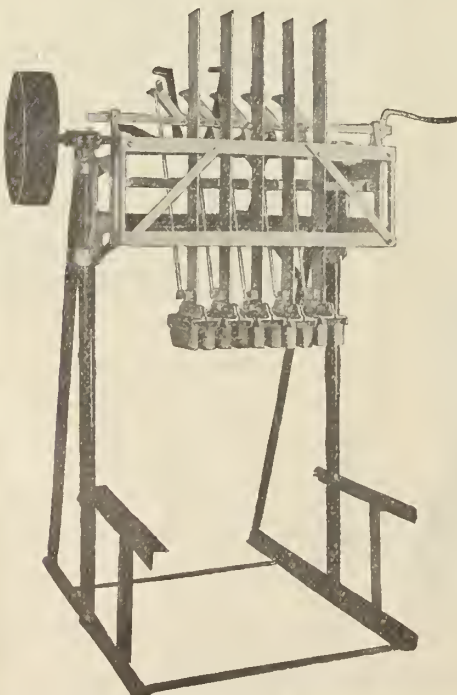
Write for our big catalog of carts, barrows and trucks. Such equipment is not expensive and it saves money.

ARNOLD-CREAGER CO.

New London, Ohio



DON'T TAMP YOUR LIFE AWAY



You CAN'T make good blocks or brick or other concrete products tamping along by hand. Your men start off nicely in the morning but the strokes get lighter and lighter as the day grows—the last block tamped at night isn't anywhere near as dense as the first one made that day. And your output is limited by your TAMPING, not by the speed of your block machine.

Increase your capacity, improve your product and save backache by installing a

NOLAN AUTOMATIC TAMPER

Built of angle steel. Mounted on the floor or hung from the ceiling. Fits any block or brick machine. Size, number and arrangement of tamping arms easily adjusted to fit any machine. Each tamping arm delivers a 50-lb. stroke, SIX TIMES EVERY SECOND.

The device is so constructed as to operate with a minimum vibration and is practically noiseless.

The purchase of this tamper won't be an EXPENSE, it'll be an INVESTMENT which will yield 100% return in a few weeks.

Write for descriptive circulars and details.

Automatic Concrete Machinery Co.

141 East Fifth St.,

ST. PAUL, MINN.

CEMENTKOTE

The fact that many of the largest users of concrete in the country are using CEMENTKOTE—that the largest concrete elevator in the world is damp-proofed with CEMENTKOTE—only goes to prove our contention—

That—Every Builders' Supply Co., Contractor and Architect should know that—They can get a damp-proofing that will damp-proof.

That—CEMENTKOTE beautifies and prevents spotting.

That—CEMENTKOTE lasts as long as the cement itself.

That—CEMENTKOTE does not interfere with the chemical action of the cement.

That—Anyone can apply CEMENTKOTE.

That—CEMENTKOTE is made in soft and pleasing shades.

That—CEMENTKOTE is not an experiment. In other words every Dealer, Contractor and Architect should know all about CEMENTKOTE. Ask for samples and descriptive matter, or better still, ask to have one of our representatives call on you.

The Tropical Oil Co.
CLEVELAND, - OHIO

Cemeline

Richmond Bros.,
117 Sixth Ave. E.,
Cincinnati, O.

1 enclose \$1.65 for 1 gal.
of CEMELINE

Name
No.
St.
City
State

If you want to make your concrete proof against water, fire, acids and alkalis, paint it with Cemeline, "cement's proper affinity." This forms an impervious coating which not only protects the structure but decorates it. It comes in nine colors. Send the coupon and get a sample can for trial.

Cemeline

CEMENT'S PROPER AFFINITY

CEMELINE is a thorough waterproofing. It hermetically seals the surface of the concrete, filling all the voids. Prevents the appearance of stains. Colors the surface in pleasing tints without defacing the natural texture of the concrete.

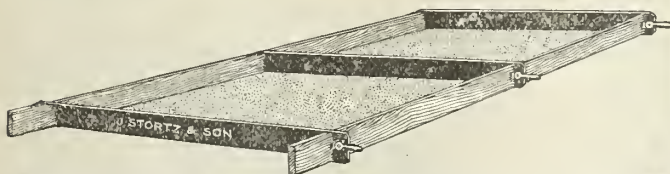
It costs \$1.60 per gallon in 5-gal. lots. Send the coupon with \$1.65 and get a sample gallon. Try it. See how you like it.

RICHMOND BROS.

Paints and Varnishes

117 Sixth Ave. E., Cincinnati, O

Cemeline



EXPANSION JOINT PLATES & FORM HOLDERS

No nails, no stakes, no braces, plates clamp securely to side forms, holding them in position. Perfect expansion joints produced. You save money on the cost of the walk and you produce a better job. Ask for catalogue including 150 sidewalk making tools.

220-222 Vine St.

John Stortz & Son

PHILADELPHIA, PA.

BITU-MORTAR WATERPROOFING WATERPROOFS PERMANENTLY

A bitumen preparation which bonds to old or new walls and waterproofs cellars and foundations PERMANENTLY, even when water is seeping through. Applied inside or outside of walls. Resists any water pressure that the wall itself will stand.

THE BITU-MORTAR CO.

342 E. 27 St. NEW YORK CITY

Send for a free copy of our book, "The Ideal Method of Waterproofing."

BUFF

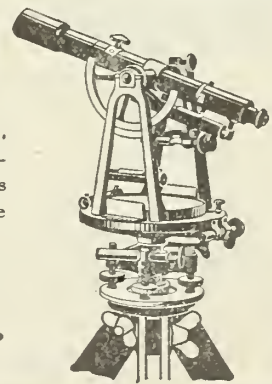
The Buff is old in name, but the most modern and up-to-date in construction. It is made by experts for the use of experts.

Send for Catalogue 32

Buff & Buff Co.

Jamaica Plain Station

BOSTON, - MASS.



Coleman's Waterproof Filler

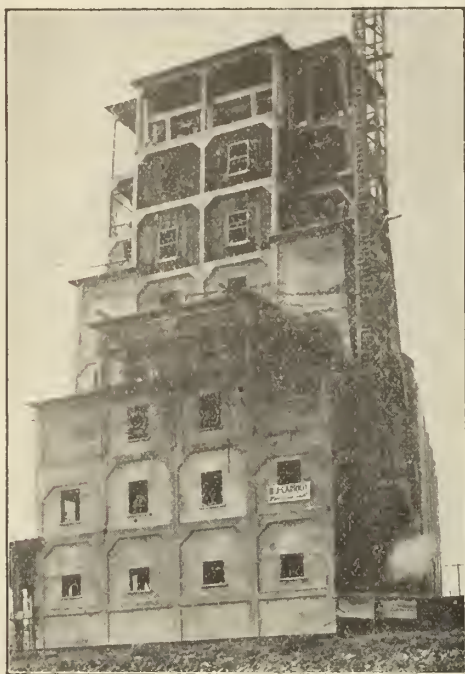
A waterproofing liquid that does the work effectively and permanently. A positive water resistant and shield against dampness and decay. Not a stain nor a coating but the only transparent waterproofing liquid FILLER patented. Chemically prepared and designed for waterproofing Concrete Blocks, Brick Walls, Stone, Wood, Plaster, Kalsomine. Penetrates the surface and becomes a part of the material to which it is applied. An honest compound. The best by test. Give it a trial. Send for Booklet.

Virginia Waterproofing Corp. Mfrs.

324-326 Arcade Building,

NORFOLK, VA.

Hy-Rib Cuts Cost of All Concrete Work



HY-RIB Sidings—Smith Bros. Grain & Elevator Co., Ft. Worth, Texas.



HY-RIB STEEL SHEATHING.

In Roofs, Sidings, Floors, Partitions and Ceilings

HY-RIB does away with the use of wood forms, producing a monolithic concrete construction, better and more economical than brick, corrugated iron or wood.

HY-RIB is a combined unit of reinforcement, centering, lath and studs. HY-RIB is a steel sheathing with deep stiffening ribs and is manufactured in three distinct types.

FLOORS and ROOFS—

HY-RIB eliminates forms, saves weight and lowers cost. Furnished straight or arched.

SIDINGS and WALLS—

HY-RIB cuts out form work and stiffening channels. Saves time and expense.



HY-RIB Roof During Construction.

PARTITIONS—

HY-RIB is complete in itself—saves steel studs, forms, labor and time. Merely set up and plaster.

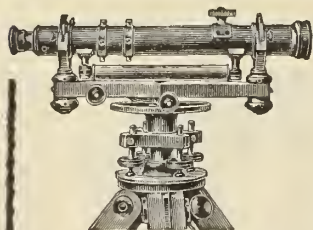
CEILINGS—

HY-RIB cuts out all expense of stiffening channels, doing away with the expensive wiring.

HY-RIB Hand Book—112 pages of specifications, applications, tables, etc. Full of valuable building suggestions. Sent FREE, if you mention your building proposition.

TRUSSED CONCRETE STEEL COMPANY

650 Trussed Concrete Building, Detroit, Mich.



The illustration shows our Architect's and Builder's Level, for leveling walls, laying out angles, grading streets, sewers, drains, sidewalks, etc. Ask for Circular 25.

LEVELS

The purchase of a level or a transit isn't an expense, it's an investment. Many times, by avoiding errors, you can save the cost of the instrument on one job. Mistakes are expensive. Engineers, contractors, architects and builders who use Kolesch levels have error-proof work.

KOLESCH & CO.

Surveying Instrument Makers.
138 Fulton St.

Established 1885
NEW YORK

VAN DORN'S Steel Joist Hanger

Specially Adaptable for

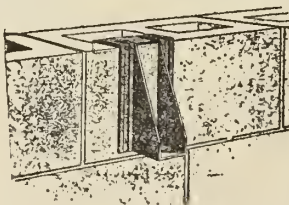
Cement Building Block Construction, Brick Walls, Wood and Steel Beam Girders

SEND FOR CATALOGUE

The Van Dorn Iron Works Co.

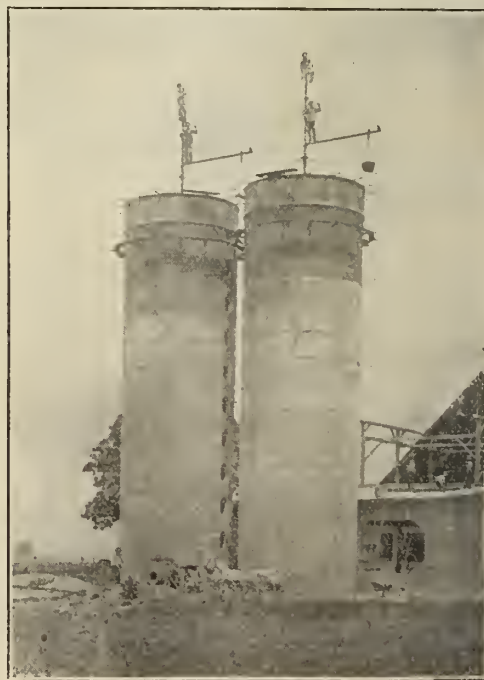
CLEVELAND, OHIO

Structural Steel and Ornamental Iron Workers



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On Page 35

Of our catalogue there is an absolutely authentic statement regarding the speed with which the POLK SYSTEM MACHINES will work for you.

BUT the speed of construction is only one of the MARVELOUS EXCLUSIVE FEATURES. THERE ARE ONE HUNDRED AND TWO OTHERS.

Ask the postmaster for a postal—ask us for a catalog.

POLK GENUNG POLK CO., Inc.

Fort Branch, Indiana

If Your Present Demand is for Blocks 8x8x16, Why Don't You Install a

HERCULES SPECIAL MACHINE

With Complete Equipment for **\$95**

It's the BEST block machine in the world—because you can add a plate at any time to make almost anything in any width, any height or any length up to 32".

You can make stronger, better and more durable blocks—because this machine allows for the use of coarse gravel or crushed stone, mixed WET. This is one reason why so many of the large contractors have installed Hercules machines. Read what one large builder in New Zealand writes:

Century Cement Machine Co.,
Rochester, N. Y.

Gentlemen:—Rush catalogue at once with full information, prices, etc. I have seen the work done by Mr. C. F. McDonald's machine and I think it the best work I've ever seen.

(Signed) JOHN B. DRISCOLL.

This letter is merely one of hundreds we receive every year but it tells the story of another man's success. Small, cheap, limited machines have been the cause of more failures than anything else. Don't take chances—start right by installing a machine with the reputation of years back of it. Get a Hercules that will expand as your business grows. In any event investigate. Send for our catalogue today.

CENTURY CEMENT MACHINE CO.

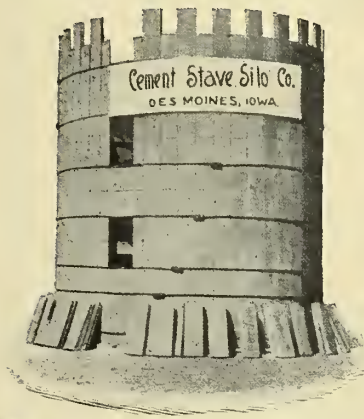
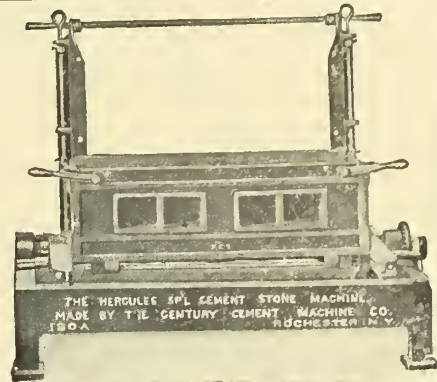
285-295 St. Paul St.,

ROCHESTER, N. Y.

Special Points of a Special Machine.

Our Special \$95 outfit consists of a Hercules Special Machine and plates for making 8x8x16 blocks. This machine is just a starter. As your business grows, add more attachments to the same machine—it will make anything up to 32 inches long. In making changes you never have to throw a part away—every part you buy may be used, no matter how big your business gets.

"The Little Book" is a vest pocket booklet full of data on the block business—our \$95 Special Outfit is shown on page 14. Write for a free copy today.



SILOS

and

Tanks

Built of

CEMENT STAVES

made on the

RAMMER-PLAYFORD CEMENT STAVE MACHINE.

MOST DURABLE and CHEAPEST SILOS ON EARTH. Never Crack, Shrink, Swell, Blow Down, Burn nor Decay. **THE FIRST COST IS LESS THAN THE COST OF THE WOODEN SILO, and THE FIRST COST IS THE TOTAL COST.**

Where the **PLAYFORD PATENT CEMENT STAVE SILO** has been used in **SILO and TANK** construction the Farmer will use no other material or method of construction.

Having secured the exclusive control of the **RAMMER-PLAYFORD CEMENT STAVE MACHINE** we are offering **EVERY CEMENT MAN** the opportunity of securing his local trade in **SILOS, TANKS, STANDPIPES, CULVERTS, WELL-CURBING**, etc.

Write us for full particulars and for terms on our **CEMENT STAVE MACHINES.**

CEMENT STAVE SILO CO.

DES MOINES, IOWA.

How to treat concrete floors successfully—

Every architect, builder and engineer who has installed concrete floors has encountered difficulty in making them satisfactory. The concrete surface is likely to dust and may absorb unsightly stains. These minor objections to concrete floors are instantly and permanently overcome by applying

"CRECONTO" Concrete Coating

This material gives the concrete floor a smooth, hard, non-absorbent finish that prevents dusting and is a bar against oils, grease or other materials penetrating the concrete and leaving stains. Particularly important in factories, hospitals, jails, garages, etc. Applied quickly, dries in 12 hours.

Ask for color card and prices.

Fireproof Building Materials Co.

507 Reliance Bldg.

Kansas City, Mo.

Southwestern Contractors and Architects: Get our circulars and prices on metal lath, wall plugs, wall ties, stair treads, concrete carts, mixers, reinforcing steel, corner beads and general building supplies.

Let This Machine Make the Sale

By the Quality and Quantity of Drain Tile it will turn out Right in your own plant.

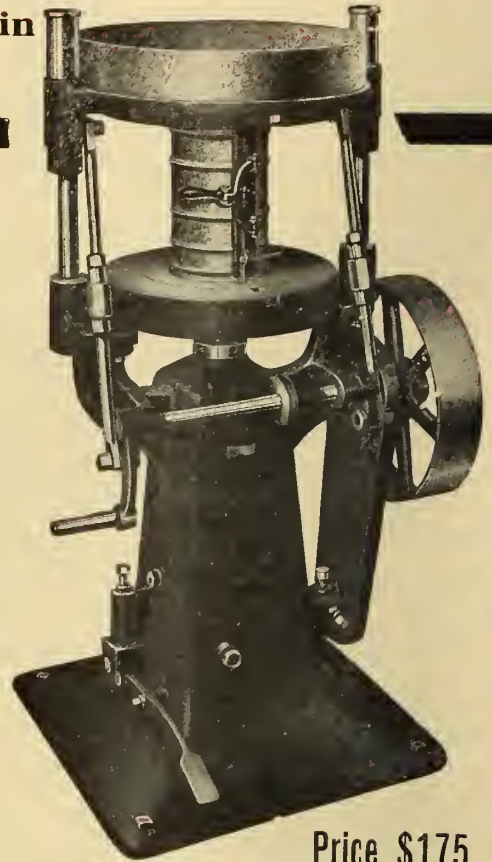
We'll ship the machine this way. You take it out from the crate, set it up and operate it from printed instructions. Make tile on it for two weeks. Test it out thoroughly and if it isn't satisfactory or as represented, then ship it back at our expense.

Dunn Tile Machine is built on the only correct principle. Broad, solid base—cast in one piece. Journals are provided with bronze bushings. All the simple machinery is enclosed in the dust-proof base.

It makes all sizes of tile from 3 to 12 inches. Capacity, 2000 tile per day with two men operating.

The cement tile business has a big future and will produce from 30 to 100 per cent profit, so that you owe it to yourself to at least investigate this business.

We have a catalogue which contains a good deal of information about this business and about this machine. Send for one. It's free.

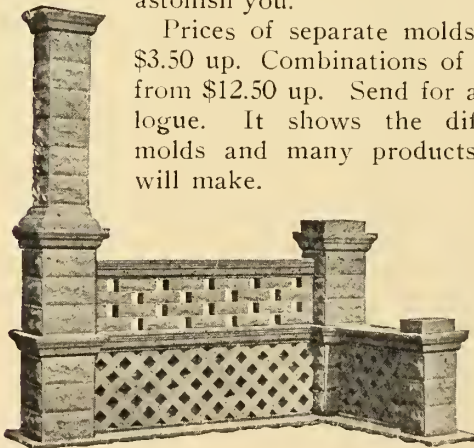


Price \$175

Ornamental Porch Molds.

We make a full line of ornamental molds for making porches, post piers, chimneys, etc. The molds are sold separately or in combinations at prices that will astonish you.

Prices of separate molds from \$3.50 up. Combinations of molds from \$12.50 up. Send for a catalogue. It shows the different molds and many products they will make.



Dunn Combination Block Machine

Makes blocks from a wet mixture because the newly made blocks are protected by the mold in turning and off-bearing. Blocks made in widths of 8, 10 and 12 inches, all on the one size pallet.

You will find it a simple, practical machine that will make all blocks used in ordinary building construction.

Send for block machine catalogue.



PRICE
\$40.

W. E. DUNN MFG. CO.

4134 Fillmore St.

Chicago

BAR CUTTERS

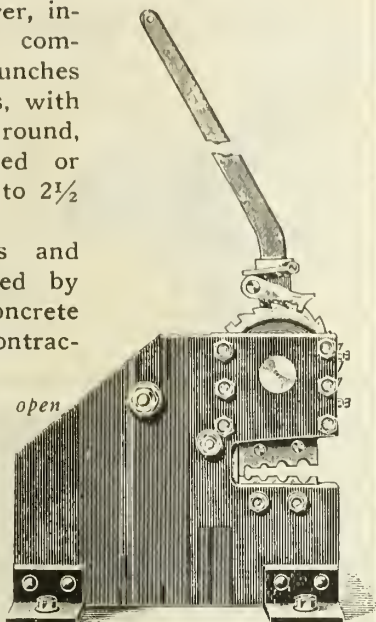
For hand power, individual or in combination with punches and plate shears, with capacities in round, square, twisted or shaped bars, up to 2½ inches.

PELS cutters and punches are used by thousands of concrete and general contractors.

Illustration shows open throat bar cutter.

Indestructible heavy rolled steel plate frame. Guaranteed without reservation to be absolutely unbreakable. Tremendous power. Light weight. Large capacity. Simple, portable, easily operated.

100% EFFICIENT

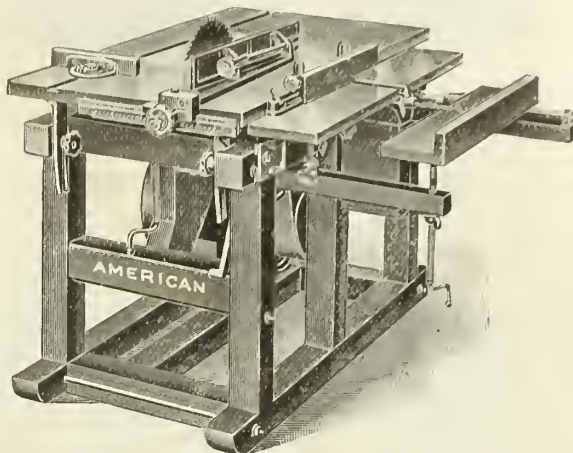


Henry Pels & Co.
88 West St. New York

Tell us what you have to cut or punch and we'll send you a description of a Pels machine for the purpose.

THE "AMERICAN"

CONTRACTORS' PORTABLE VARIETY
WOOD-WORKER
IS A THREE-MAN MACHINE



A complete saw bench—a planer and moulder—a boring machine—bought separately would cost more than the average contractor wants to pay.

But in the "American" Wood-worker you get these three machines in one, so combined that three men can work at them at once without interference—and all at a very moderate price.

There's no lost time if you have an "American"—no men standing around for a chance at the machine.

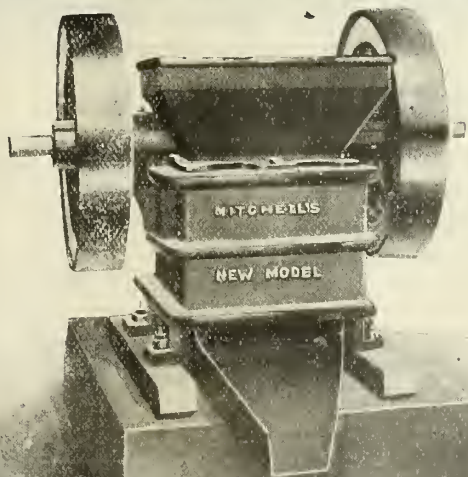
This three-man feature triples the earning power of your investment in an "American" Wood-worker.

American Saw Mill Machinery Company

84 MAIN STREET
HACKETTSTOWN N. J.

1380 HUDSON TERMINAL
NEW YORK CITY

1912
MODEL



**To Be or Not
to Be Without
a "Eureka"—that
is the Question**

?

After you receive our new 1912 catalog and have investigated the Eureka Improved Crusher and

found it to be the most efficient, most economical, as well as the simplest and most durable then ask yourself "Can I afford to be without a Eureka?"

No matter what you crush, the Eureka will save you money. It has a score of exclusive features—made in 15 different sizes in capacities from 5 to 300 tons per 10 hour day. Write today for new 1912 catalog. You can't afford to wait.

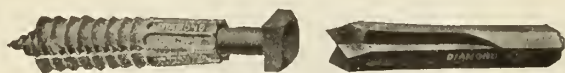
Canadian Factory
Mitchell Crusher Mfg. Co.,
Bathurst & Niagara Sts., Toronto, Can.

Eureka Stone & Ore Crusher Co.

1-3 B Avenue
Cedar Rapids, Iowa

Diamond Expansion Bolts

For fastening all kinds of material to Brick, Stone or Concrete.



"Diamond N" Expansion Bolt "Diamond N" Steel Drill

Write for samples and pamphlet and how to use them.

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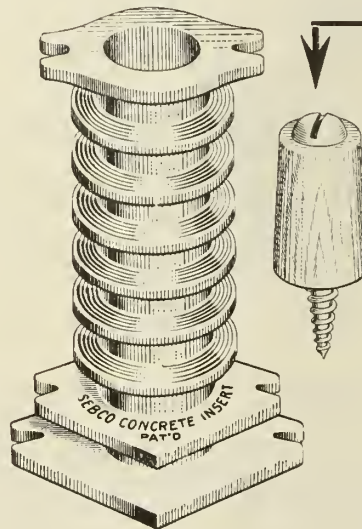
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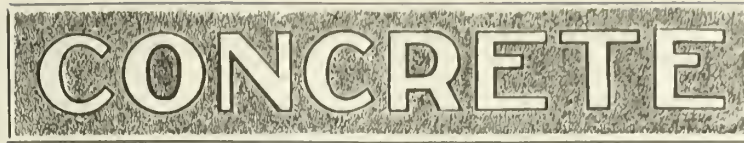
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Standard Journal
on Manufacture and
Uses of Portland
Cement.



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Correspondence solicited on all matters pertaining to cement manufacture, and concrete construction in all its forms. Discussions, notes, and inquiries from engineers and others will be gladly received.

Advertising rates upon application. Complete information regarding size, character and distribution of circulation cheerfully furnished upon request.

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Concrete Organizations, Officials and Conventions

Canadian Cement and Concrete Association; Secretary, William Snaith, 57 East Adelaide St., Toronto, Ont.

National Association of Cement Users, Harrison Bldg., Philadelphia, Pa.

Cement Products Exhibition Co., 72 West Adams St., Chicago, Ill.; Secretary-Treasurer, J. U. C. McDaniel, 108 La Salle St., Chicago, Ill.

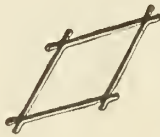
Northwestern Cement Products Association, J. C. Van Doorn, Secretary, Security Bank Building, Minneapolis, Minn.

Iowa Association of Cement Users; Secretary, Ira A. Williams, Ames, Ia.

Nebraska Cement Users' Association, Columbus, Neb.; Secretary-Treasurer, Peter Palmer, Oakland, Neb.

Oklahoma Cement Users' and Contractors' Association; Secretary, D. C. Patterson, 336 Bassett Bldg., Oklahoma City, Okla.

Concrete Machinery Manufacturers' Association; Secretary, Le Roy A. Kling, Cedar Rapids, Ia.



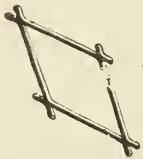
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CONCRETE

Vol. XII

MAY, 1912

No. 5

Editorials

THE matter of "good roads" is now attracting country-wide attention. A suggestion: Wayne county, Michigan, has 33 miles of concrete roads. The maintenance charge in 1911 was \$200—\$6 a mile—and most of this amount was spent on the gravel shoulders and ditches. Wayne county will build 40 to 50 more miles of concrete roads this year. Wayne county likes them.

* * *

WHEN a competitor cannot be persuaded, legislated, wheedled or guffawed out of existence, nor be confounded by falsehood, he may sometimes be clubbed into a stupor. Certain clay interests have bought some territorial rights to manufacture a patent concrete sewer pipe on the Pacific coast, and they are dismantling the factories. *Not being able to stop a demand they had to stop the manufacture.* This is an obvious surrender to a superior article. When in the war of competition resort is had to the sand-bag (or the money bag) the *sandbagger* practically concedes that the *sandbaggee* has the best of the argument. It is no new thing to prevent competition by killing the competitor.

* * *

CONCRETE—stony, of the earth, earthy, practical and time-defying—has taken its place beside the pulpit, and on the rostrum of a Topeka, Kansas, church, has served to inspire, in its quality of permanence and strength, a lesson in character-building by the Rev. C. M. Sheldon. In this connection congratulation is due the Simpson Cement Mold Co. An outfit to make boy-size concrete building block, made by that company, was the means of supplying a *concrete* example to make clear some spiritual abstractions. We quote from a letter written by P. H. Forbes, manager of the Portland Cement Stone Co., Topeka, Kans.: "Mr. Sheldon put the outfit in the basement of the church and engaged two or three boys to make the block for a house designed by a builder who supplied blue prints, and he afterward had the house built upon the pulpit platform while he preached a series of sermons on building character, the house being built of lasting materials, while on the other end of the platform a house was built of indifferent material and practically planless, the two houses progressing each Sunday for a month, before completion. Each house was finished, even to windows and doors, the finished products illustrating the effect of care and good judgment in the building of houses and equally in the building of character." Long since, concrete took its place in the world of work, in docks and dams, bridges and buildings, and in the walls of the temples themselves. Yet now we find it, mutely inspirational, before diviners of destiny, and we shall hear no more cavil, for surely its quality of endurance has become proverbial.

* * *

UNITED STATES Engineers are of the opinion that ordinary earth levees will hold against the floods of the Mississippi river. United States Engineer C. McD. Townsend, headquarters at Detroit, for years identified with Mississippi river improvement, declares that one muskrat can render nil the protection otherwise afforded by

hundreds of miles of levees. Besides muskrats there are crawfish to burrow and pieces of timber left by contractors to decay in the levees, developing openings through which a small stream of water may grow to be a disastrous flood. Levees are built piecemeal. Their construction is regarded as something of a job eternal—to be extended when any money or time is available for the work. It has never been thought practicable to build them of anything but the earth available along the river because the use of anything more durable would entail prodigious expense. Some levees are built under the direction of United States government boards (the river being divided in four districts under three directing officers for the federal work); others are built by state levee boards, and still others by local levee boards. The heights of the levees vary from four to forty feet. The people of the Mississippi valley determined long ago to confine a forty-mile-wide river (flood time) to a channel a mile or so wide and to use in this confinement the same alluvial earth which the river had deposited. The property loss of many millions of dollars—not to mention much comfort and even some human lives—in the recent floods, would seem to indicate that this levee building has not been entirely successful. Yet it is pointed out that the more a river is confined, the more destructively will it rage in time of flood through the weak spots of its confining wall. It is talked of, rather indefinitely, that *some day*, when the levees all down the Mississippi have been built up uniformly to a common level of anticipated floods, *something* may then be done to make this loose earthwork protection permanent against the destructive tendencies of burrowing animals and rotting timbers. Colonel Townsend suggests that it may be found advisable to put in the center throughout the length of the levees a curtain wall of concrete as an obstruction to the burrowers. So far nothing of this kind has been done. In some places along the river, where the "wash" from passing steamers has a destructive influence on the earth banks a concrete facing five or six inches thick has been put on.

The nub of the whole matter is here: The United States government usually is impatient of makeshift methods in its construction work of every nature and it is a matter for boasting that nothing is too good for Uncle Sam. The country has just had a lesson. When the *Father of Waters* imbibes from his forest-denuded slopes the suddenly released freshets (which are the penalty of too assiduously cleared land) something is due to happen in the broad valley unless his coming has been discounted in adequate provision to keep him in his path. Why not concrete? If it is a fact, as good authority says, that earth levees are proof against the water, why not the use of concrete mentioned by Colonel Townsend to make these earth levees permanent? The cost of such construction along the Mississippi should not be great with the water facilities for handling materials and in any event the cost should not be prohibitive in view of the destruction wrought

in the last few weeks and in the face of the fact that nobody is certain it will not occur again next year.

* * *

Officer, he's in again.

The publicity end of the clay products people is out with a rather astonishing and interesting document, relating to the controversy between concrete and clay in Kansas City, Mo., a territory, by the way, in which the entire organization of the clay interests has been hard at work. Here the clay products are heartily supported by the daily press, while concrete is looked upon with indifference and suspicion.

The document referred to embodies a report of the Public Improvements committee to the upper house of the common council of Kansas City. The report sets forth, in plain language, that an ordinance providing for the use of concrete in Kansas City is invalid, for the reason that the selection of material to be used in public works does not properly come within the province of the council. City Counselor John G. Park, in a formal opinion, held that the ordinance was invalid for the reason stated.

A hearing by the Public Improvements committee, consisting of three members of the council, was held in November of last year, at which an inquiry was made into the relative merits of clay and concrete in sewer construction. Former city officials recommended vitrified clay products and those who testified in favor of concrete were men like Prof. Erasmus Howard, of Kansas University; John Donnelly, a former city engineer of Kansas City; A. J. Hammond, formerly city engineer of South Bend, Ind., and J. P. Shearer, of the Board of Public Works, Milwaukee, Wis. All of these testified that cement or concrete pipe, of proper material, properly made, under proper inspection, and properly cured and inspected, could be properly used in the sanitary sewers of Kansas City.

After a week's hearing, the committee of three men made a committee recommendation that the matter of selecting materials should be left entirely to the Board of Public Works, and that the ordinance should not pass. The three endorsed clay pipe of the vitrified type, but obviously their recommendation could have nothing official in its character, for the reason that the city's legal adviser had told them that the council could not specify materials, that being a matter for the Board of Public Works.

The ordinance, in accordance with the opinion of the City Counselor, was lost. That is, the council declined to pass a measure that it had no legal right to pass.

That is all there is to it. But the clay people reprint the committee's report and the text of the ordinance, with the introduction: "This report means that after the most complete and thorough investigation of the relative merits of sewer pipe material that has ever been conducted by any city in America, Kansas City has decided not to pass the

ordinance favoring the use of concrete pipe for sewers, but to allow the Board of Public Works to use vitrified salt-glazed clay pipe as heretofore." The report means nothing of the kind, either as stated or implied. The reasons why the ordinance was not passed by the council are detailed above, and they are the only reasons. The interpretation put upon the committee's action by the clay publicity men is entirely false and misleading. It will deceive no one who reads the subject matter with care.

It now remains to be seen whether or not the Board of Public Works of Kansas City will continue to use concrete where it is found to be best. We think that it will.

* * *

In the December issue CONCRETE asked for *economy suggestions* from concrete products manufacturers. The economy might be the result of a special piece of equipment, a method, or a plan in the layout of the plant. Next month some of the material received will be published. More will follow in later issues. Many suggestions were sent in and it has been decided that the most important one came from C. J. Rowley, of the Builders' Concrete Stone Co., Pawtucket, R. I. The \$10 award goes to him. Many others will receive extensions of their subscriptions to CONCRETE. Mr. Rowley sent two pencil sketches of his plant and explained how his arrangement of the equipment made for economy. The worth of Mr. Rowley's suggestion is not so much the intrinsic value of the plan of the plant as is his explanation that a certain arrangement is better than other arrangement *because*—the contribution serving to put a proper emphasis upon arrangement of equipment to save steps, to save men and to avoid unnecessary handling of materials.

* * *

Many readers of CONCRETE who make block, dimension stone, brick and other concrete products are reaching out, enlarging their plants and improving their methods. There is a great interest in steam curing methods. CONCRETE wants descriptions of curing plants with all the details. We know that our readers can give valuable information and therefore \$25 will be paid for the best description of a steam curing plant mailed to us on or before June 10. Read further particulars in an announcement, page 105, this issue.

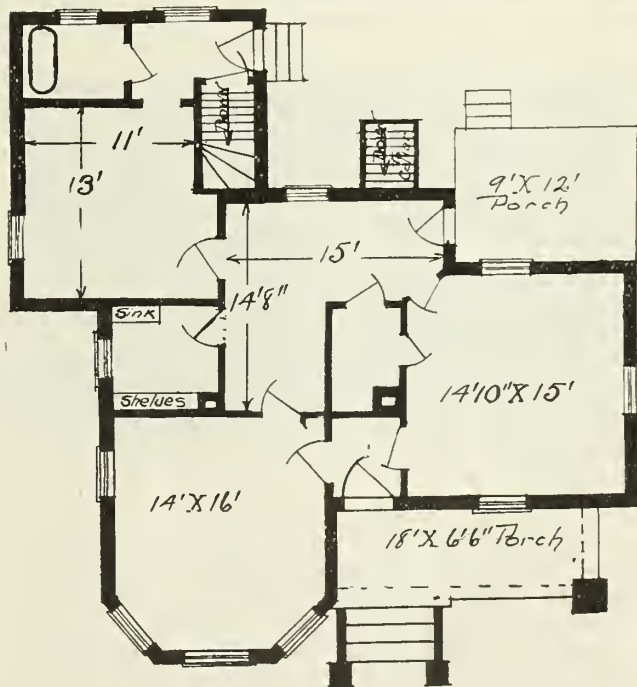
* * *

You know, we know, almost everybody knows now that residences may be built, event to most of the furnishings, which are proof against fire. Also we all know that very few people, for one reason or another, build houses of that kind. Perhaps as long as the forests last people will use wood. They like the grain of the wood. So do we. Yet sensible dealers in lumber have given up the idea to combat concrete as a building material. So while they continue to sell lumber they are also selling cement, and find a gratifying profit in combining a trade in the two materials. J. Crow Taylor, closely in touch with lumber interests as secretary of the Kentucky Retail Lumber Dealers'

Association, contributes a short but very interesting article to this issue of CONCRETE which explains quite emphatically why lumber dealers are interested in cement.

Concrete Block House in Indiana

The house shown in the plan and in the illustration from a photograph was built by Fred E. Cook, at New Harmony, Ind., and cost only about \$1,900, including walls, fence, curbing, etc. The inside finish is of oak. Mr. Cook made the block himself. They are 8"x8"x16". The block are faced with coarse sand in a mixture of 1 part cement to 1½ parts sand and the body mixture is of 1 part cement to 3½ parts bank gravel.



The lattice block used in the fence and on the porch, and the balls which surmount the newel posts, were made in Simpson molds. The square part of the columns is of 4"x8"x16" block. The caps on the fence and balustrade and on the columns, also the base of the columns and the base of the newels, were made in wood molds of home manufacture. The molds for the window sills were also made by Mr. Cook.

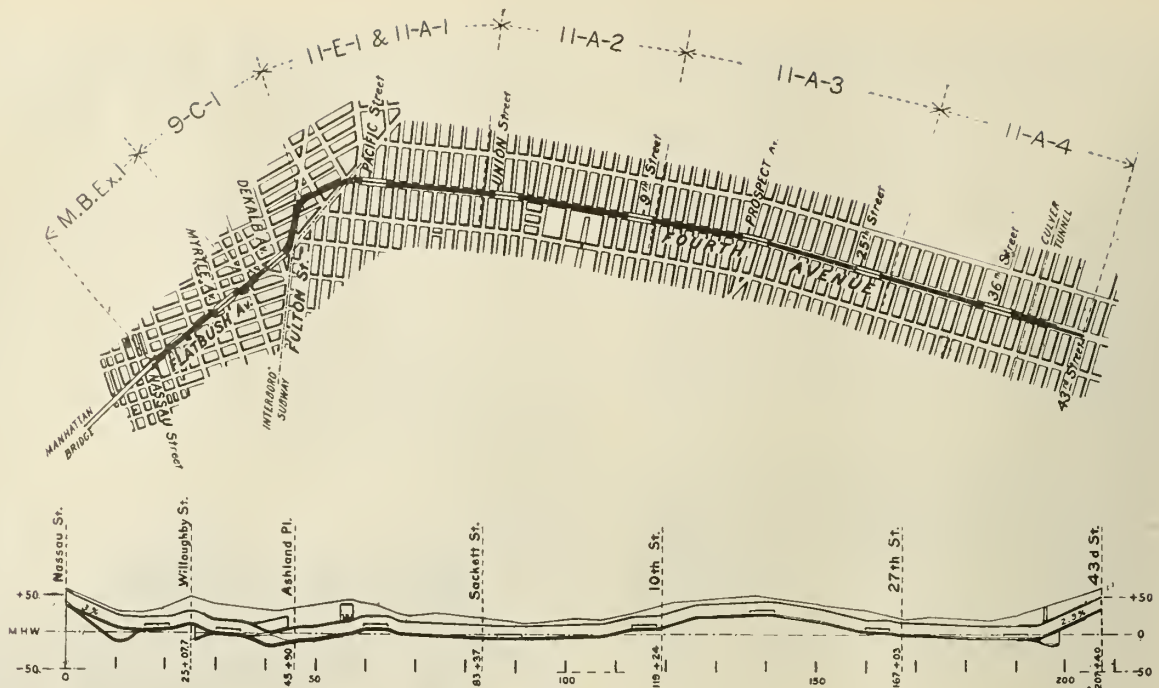


Fig. 1

Building a Four-Track Subway*

How Materials and Equipment Are Handled
on Big Concrete Job in Brooklyn, New York

BY FREDERICK C. NOBLE†

The Fourth Avenue Subway, Brooklyn, N. Y., is an example of the use of reinforced concrete on a large scale. The portion now under construction extends about four miles from the Brooklyn end of the new Manhattan bridge, over which it is intended to connect with a subway system in Manhattan. The route lies through Flatbush avenue, Fulton street, Ashland place, and Fourth avenue, to Forty-third street; in a direction generally south. From there it is proposed to extend it in future by two branches to the southern limits of the borough. The subway is being built for the City of New York, under the supervision of a state commission, with Alfred Craven as the chief engineer. The work was divided into six contract sections, which were let in November, 1909, at an aggregate price of about \$15,000,000. Construction is now nearly finished.

The structure normally has space for four tracks; two for local and two for express service. These are increased to seven and eight in places where connection spurs for future extensions are provided in two levels to avoid turnouts at grade. There are six local and two express stations, with platforms long enough to accommodate ten-car trains.

The excavation was principally in a morainal deposit, consisting of sand with more or less gravel and boulders. No rock was found anywhere on the line. Some quicksand was met near the middle of the route,

where the subway traverses ground filled in over the bed of an old salt marsh. Ground water was encountered at or near tide level and was controlled by pumping. Excavation was usually carried on under covered roadways, but in the extension of Flatbush avenue open excavation was permitted.

In connection with the work it was necessary to underpin about forty buildings with masonry piers to sub-grade in advance of the excavation, where it approached close to and below their foundations. It was necessary also to support temporarily the elevated railway on Fulton street, and to drift a crossing under the present subway in operation in Flatbush avenue. Since Fourth avenue lies along the foot of a considerable drainage area, sloping from Prospect park, it was necessary to depress or intercept many cross sewers carrying a heavy storm-flow, and to provide under-grade crossing at intervals. About six miles of sewers, of all sizes up to 9' 6" diameter, were thus built or rebuilt.

The typical four-track section is shown in Fig. 2. The roof, sides, intermediate walls, and floor where below ground water, are reinforced with corrugated bars ranging between 1¼" and 5/8" square. The design provides for a uniform live load of 300 lbs. per square ft. at the street surface. Waterproofing is used at stations on the roof and sides, and generally below ground water on the sides and floors. Elsewhere the concrete is relied on for sufficient protection against seepage.

AMOUNT OF CONCRETE USED

The amount of concrete required is somewhat over 400,000 cu. yds. The usual proportions are 1:2½.

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo.

†Division Engineer, Public Service Commission, Brooklyn, N. Y.

4½. Much of the excavated sand is suitable for concrete and is used accordingly. The remainder is washed or dredged sand from the north shore of Long Island. The aggregate is mostly washed or dredged gravel from the same source, usually under one inch, and well graded in size. At times when gravel is not readily obtainable, cobbles and fragments of boulders are crushed and used. The concrete is mixed rather wet to facilitate its flowing around the reinforcement, as this is generally spaced quite closely.

Reinforcing rods were required to be deformed. The Johnson and Havemeyer patterns were used. Transverse and longitudinal rods were wired at their intersections. (See Fig. 8.) For this purpose, special devices of bent wire were used, manufactured by the Wedmore Co. These served at the same time to space the rods, or to hold them at the proper minimum distance from the forms. Where unusually long spans or concentrated loads occurred, the roof was of girder and jack-arch construction. To hold the thin covering of concrete under the lower flanges, special clips or hangers of twisted wire were attached at intervals by bending them over the upper sides of the flanges. Sometimes a strip of coarse wire mesh was wrapped loosely around the flanges to serve the same purpose. In a few instances, where the concrete under the flanges tapped hollow, it was chipped off around the edges of the flange, and a strip of wire mesh was attached and covered with mortar blown in place by means of a cement gun.

Concreting was permitted throughout the winter, except on the very coldest days. Materials were heated by fires or steam coils, and the freshly laid concrete was covered with salt marsh hay and tarpaulins. Salamanders were placed under the roof forms in some places. On account of the varying conditions of mixing and degree of exposure, it was impracticable to devise a set of rules to fit all cases; but the criterion was held to be the temperature at which the mixture could be deposited in the forms.

Roof forms were struck as soon as the temperature conditions and setting qualities of the particular brand of cement used would permit. As this was a factor limiting progress, especially in the case of large steel forms, it was desirable to strike them as soon as practicable. In summer they were struck after 80 hours, and in exceptional cases even at 50 hours, but in winter it was sometimes necessary to wait a week or 10 days before striking.

The methods of mixing and handling concrete vary between the different sections and are described briefly as follows. See fig. 1.

Section M. B. Ex. 1, extending from Nassau street through Flatbush avenue to Willoughby street, is being built by Smith, Scott & Co., contractors.

Materials for concrete are brought on the work over a tramway extending along each side of the cut from

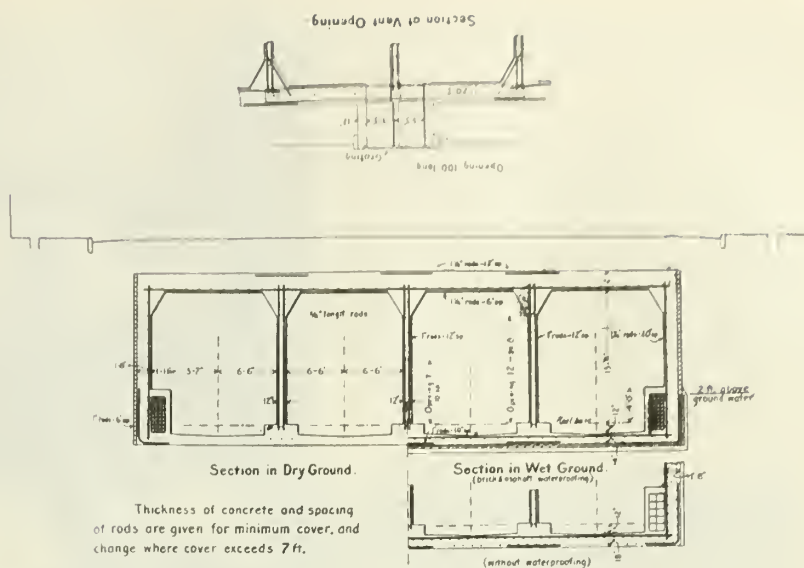
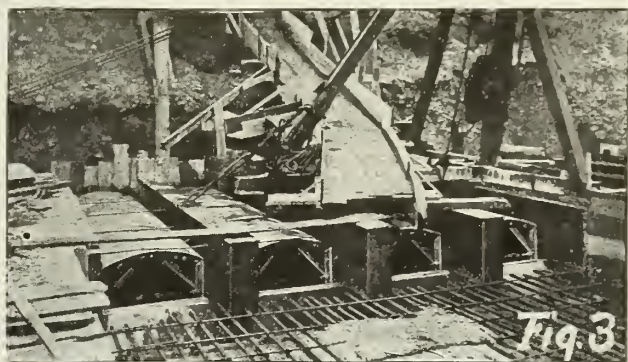


Fig. 2

dock under the Manhattan bridge. Sand and gravel are loaded at the dock in Continental side-dump cars, drawn by Porter & Baldwin 20-ton dinky locomotives. The cars are run up an incline and dumped into bins over the mixer, which is located nearly central on the section. This is a 1½ yard Ransome machine, operated by a 30 h. p. electric motor. The mixture is discharged at the track level into Ideal bottom-dump cars of one yard capacity, in trains of three or four



cars, hauled to the point of deposit, and dumped in frame chutes through which it slides to the forms.

As the sides of the cut were almost self-sustaining, and as the contract terms allowed open excavation on this section, very little cross-timbering was necessary; a condition that greatly facilitated the erecting and moving of forms. There were of the Blaw collapsing pattern, with stiffened steel sides, and wood top to suit the varying width of roof. The floor having been laid for the entire width of structure, and the reinforcement placed for the sides and intermediate walls, the forms were moved into place, one 20' section at a time, traveling on tracks laid on the floor. In this way it was possible to lay concrete for the walls and roof over four tracks in sections 20' long at a continuous operation. These forms were very similar to

those used on one of the lower sections, in which connection they will be more fully described.

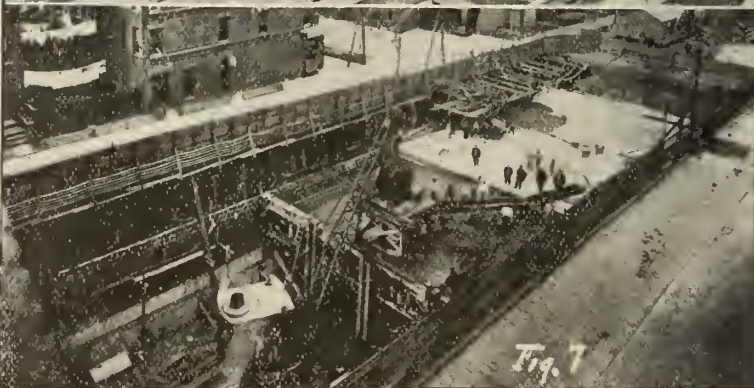
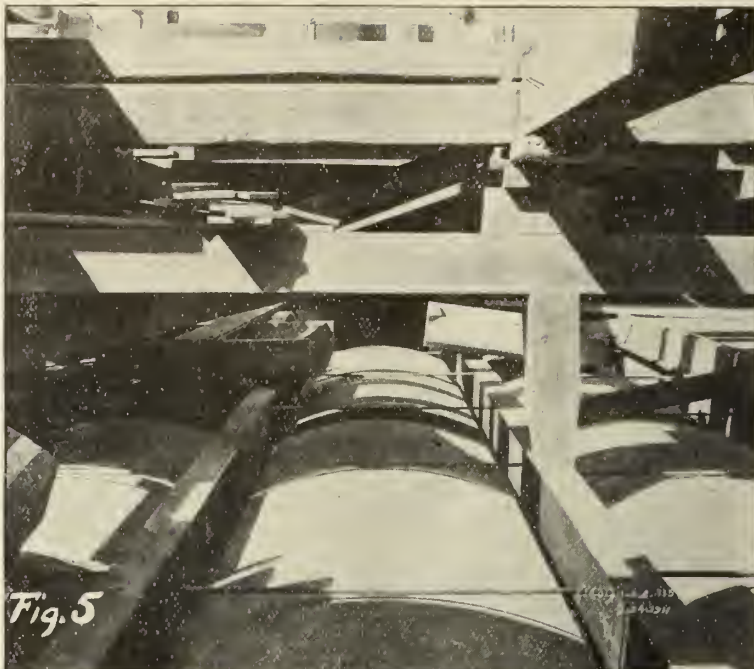
Where structural roof framing was substituted for rod construction, Blaw centering (fig. 3) was used to turn the jack arches. These were of angle stiffened plate, with an adjustable center strip of wood for varying spans, and were set in position on falsework. The span was maintained by turnbuckle ties, which also served to draw in the sides on striking the forms. After striking, each section was lowered with a wind.

Section 9-C-1, extending from Wiloughby street along Flatbush avenue and Fulton street to Ashland place, is being built by William Bradley, contractor.

Materials for concrete are delivered at a large yard alongside the subway between Third and Sixth streets, where this contractor has a cement storehouse and a stable for his horses. Teams are employed for moving all materials. Concrete was mixed principally by a Hains gravity mixer located in the cut. Storage bins for sand and gravel were placed just below the street level. These fed four loading hoppers, each of one-bag-batch capacity. After moistening, the contents were dropped successively through three mixing hoppers, receiving the full dose of water in the first one. The middle hopper was slightly offset from the other two. The mix was discharged at the bottom level into cars which were run onto a cage, hoisted above the street surface and dumped into an overhead bin. From the bin it was almost immediately discharged through a gate into tight rear-dumping steel carts of about $1\frac{3}{4}$ yd. capacity, which were teamed to the point of deposit. The mixture was dumped on hopper platforms and conveyed through 8" telescopic chutes to the forms. The opening at the bottom of the hopper was closed by a spatula until the entire load was cleared.

Most of the structure on this section is of steel bent and jack-arch construction, so that no unusual form-work was required. The reversion to this older type of design was at the request of the contractor, and partly because of the concentrated loadings brought by the elevated structure and building foundations to be supported permanently on the roof.

Sections 11-E-1 & 11-A-1, which together form one



contract section, extend from Fulton street, through Ashland place and Fourth avenue, to Sackett street, and are also under contract with William Bradley, same as those described for this contractor's adjoin-

(Continued on page 54)

How Benches for Greenhouses are Made

Description of the Forms Used in Concrete Work In Connection with Flower Growing

BY MARC N. GOODNOW

A general description of the use of concrete lumber in greenhouse flower bed or bench construction appeared in the February, 1912, issue of CONCRETE. Two Chicago companies which have adopted this method were mentioned: one using the monolithic form, the other the "knock down" form. The latter method, now being extensively used by Pochlmann Brothers, Morton Grove, Ill., is particularly noteworthy because of the extent to which the concrete is used and because of the fact that men who are not expert in the use of cement have been able to do the work successfully.

The concrete lumber used in the construction of these benches which at present extend the full length—500'—of nine greenhouses containing four benches each—a total of 18,000' of benches—consists of the following pieces:

Tapered posts to support benches. Roughly, these posts are 6" square at the top and 8" square at the bottom. The corner pieces used in the molds, however, (see figures 5 and 6), bevel these angles, in reality forming an octagon. The posts are 2' high and rest on circular bases 10" in diameter. Each post has a slot on the side (and opening also at the top) which is $8\frac{3}{4}$ " up and down, 2" deep, and $1\frac{1}{2}$ " wide at the back and 2" wide at the face of the post. See figure 2, and A in figure 3.

Cross beams, 49" long, 6" wide, $1\frac{1}{2}$ " thick, which fit into the slots of the posts crosswise of the beds. See B in figure 3.

Stringers, 6' $2\frac{1}{2}$ " long, 4" wide, 2" thick, which rest on the cross beams and support the bottom slabs through the middle, reinforced with $2\frac{1}{2}$ " bars. See C in figure 3.

Side slabs or "Ls," 6' long, 10" high, $1\frac{1}{4}$ " thick, with an angle $3\frac{1}{2}$ " wide at bottom upon which the bottom slabs rest, reinforced with mesh wire 10" wide and 4 angle irons 10" long. See D in figure 3.

Bottom slabs, 53" long, $9\frac{1}{2}$ " wide, $1\frac{1}{2}$ " thick, reinforced with $\frac{1}{4}$ " twisted bars, forming the bottom of the beds. See E in figure 3.

End pieces, 55 $\frac{1}{2}$ " long, outside measurement, which close up the ends of the long beds and are rounded at their ends with short elbows; same height and thickness as side slabs. This is not shown in figure 3, because, without it, the construction or rather the method of assembling the pieces is more readily shown.

A bench in course of construction, illustrated from a photograph, is shown in figure 1, reprinted from February, 1912, issue of CONCRETE.

The bottom slabs, side slabs, stringers, cross beams and end pieces were made in a single mold by devising compartments of the proper size. The mold (see figure 4) consists of two L-shaped heavy boards covered with galvanized iron. These can be

adjusted to each other in any length or breadth. It has no bottom, that being furnished by a wooden board $1\frac{1}{2}$ " thick which serves as a stable support for the pieces of concrete lumber formed upon it when placed upon a rack to cure. The mold locks about this plank by means of clamps and screw attachments. Its depth is $12\frac{3}{4}$ ", which allows for the

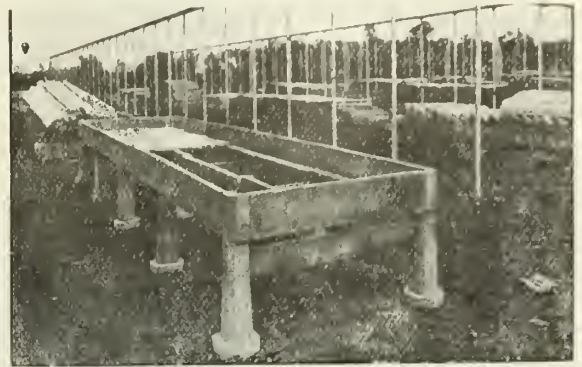


Fig. 1. Building a Bench of Concrete Lumber

thickness of the bottom timber, the thickness of the angle for the "L" slab and also the height of this "L" side slab which is poured in an upright position instead of flat, as the other slabs are formed.

For the bottom slabs, the required thickness is adjusted by supporting the plank bottom upon

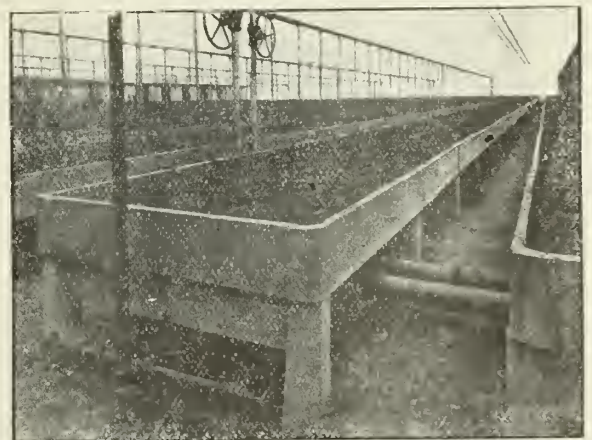


Fig. 7. Benches in Place

standards inside the mold to a point within $1\frac{1}{2}$ " of the top of the mold. Into this shallow basin the concrete is spread, the $\frac{1}{4}$ " bars placed, the whole tamped and allowed to set. Then, by loosening the locks of the mold the entire concrete slab is lifted bodily from the mold by means of the plank bottom and placed on a rack to cure.

The cross beams are fashioned and reinforced in the same manner, the length and width being reduced. The stringers are made by dividing the mold into two compartments 4" in width and reinforced with two $\frac{1}{2}$ " twisted bars.

In making the side slabs or "Ls" the flange of $3\frac{1}{2}$ " is set on the bottom of the mold first, two of

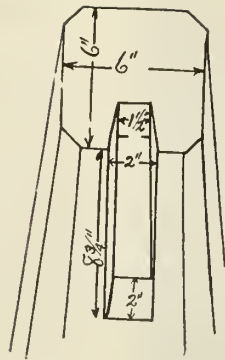


Fig. 2. Upper part of Concrete Post used to Support Benches, Showing Slot where the Cross Beam is Inserted

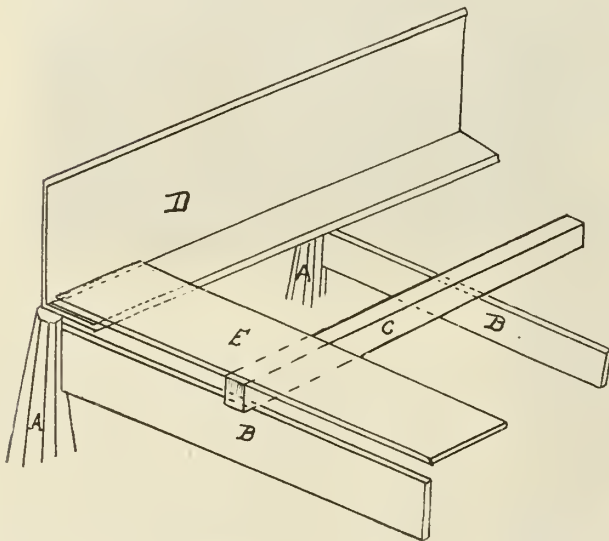


Fig. 3. Showing Relation of Pieces which Make up the Bench

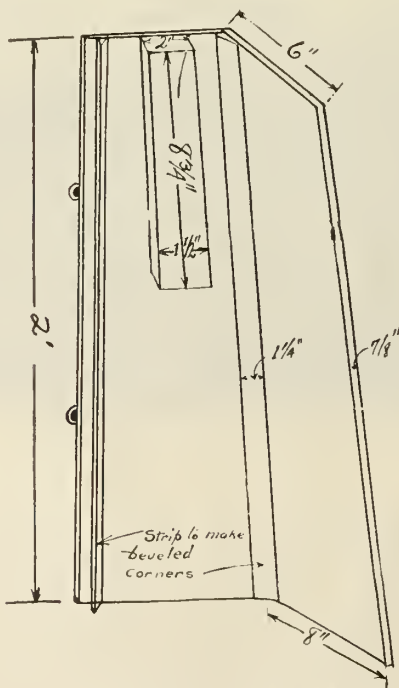


Fig. 5. Interior View of Half Section of Post Mold; both Sections Are Locked by staples and hooks or latches; also see Figure 6

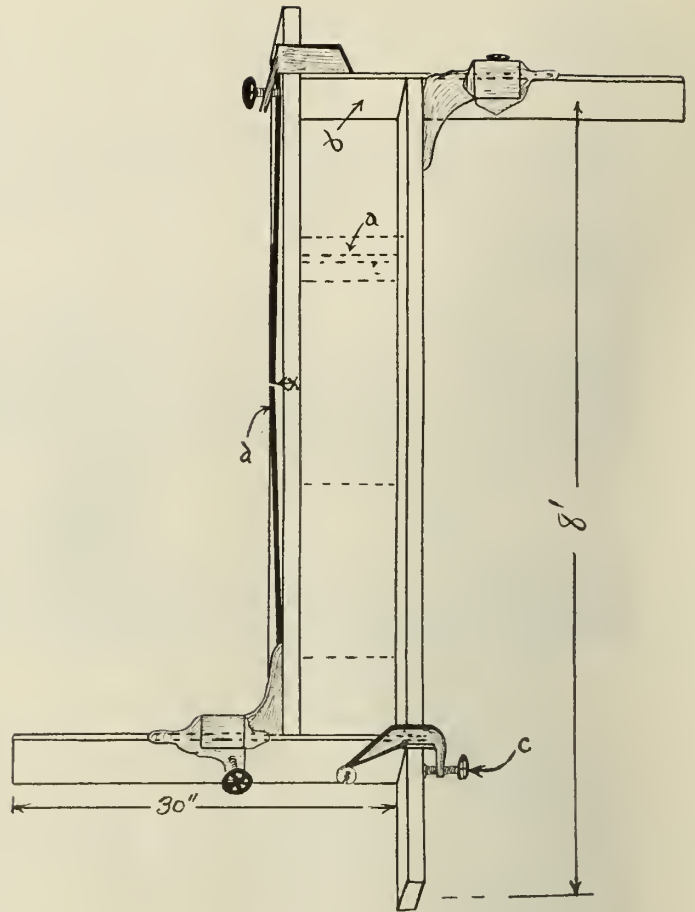


Fig. 4. Mold Used to Make all Pieces Except Posts

The mold is adjustable as to length and width. Boards at the sides are of 2" stuff, lined with galvanized iron. The end pieces with screw, clamp attachments are of iron $\frac{1}{2}$ " thick. At *a* is block or standard which supports the wooden bottom of the mold; *b*—height or depth may be $12\frac{3}{4}$ " or 7 or 8", depending upon the position in which it is desired to cast the side and end units of "L" section; *c*, screw clamp which swings free so that sides may be removed; *d*, two bars which extend along the boards on the sides to brace them into alignment and keep them from bulging.

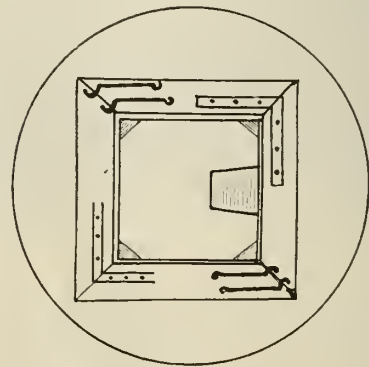


Fig. 6. Looking down on the post mold, 6" square at the top and 8" square at the bottom, resting on the 10" diameter base and showing latches on outside and the corner strips and the block to make slot on inside.

Advantages of Concrete Arch Bridges*

Disadvantages of Some Common Types of Bridges Because of Imagined Economy

BY DANIEL B. LUTEN†

A concrete arch, in harmony with its surroundings, but without ornamentation or embellishment of any kind, is an exceedingly beautiful structure. A concrete girder under similar conditions may be an exceedingly ugly structure. (See illustrations.) Why is it that the concrete girder bridge presents so undesirable an appearance, while the arch bridge is such a handsome improvement? Not alone because of the natural beauty of the surroundings; not merely because of the whiter concrete in the arch view. The concrete arch presents the more

steel trusses and girders have a distinct advantage. Steel girders, moreover, are better adapted to soft foundations than steel arches. But in concrete bridges the very reverse conditions apply. It is the concrete arch that is easier to erect than the concrete girder and it is the concrete arch that is better adapted to soft foundations than the concrete girder.

The cheapest forms of steel highway bridges have been the "bedstead" bridges in which the beams or trusses are supported by steel legs resting on wooden sills in the bed of the stream and with wood or



Concrete Arch Bridge

pleasing appearance because it employs concrete in a thoroughly natural manner. Every one understands that concrete is a masonry material and that, like stone, it is strongest in compression and while it is true that steel may be embedded in concrete to resist tension it is not always easy to show its presence by external design. Hence the eye is offended by the long open girder as it never is by even the flattest of arches. The layman may be surprised by the lightness and boldness of some of the arch designs but the surprise is of a pleasing kind, whereas the feeling with respect to the long span concrete girder is one of wonder that it stands at all, a warning to stand from under. Almost any kind of a concrete bridge, however, is better than the temporary wooden and steel bridges that have been erected on our highways in times past.

Concrete as a structural material is full of surprising possibilities and one of those is that the most beautiful and appropriate applications of concrete to bridges, that is in the arch form, is also the most satisfactory from almost every engineering standpoint. In steel bridges, the arch is difficult to fabricate and difficult to erect, and consequently



Concrete Girder Bridge

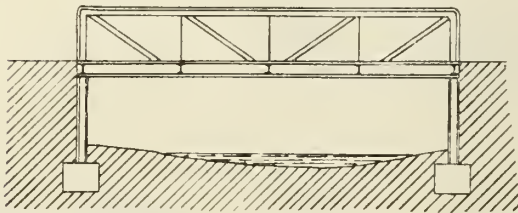
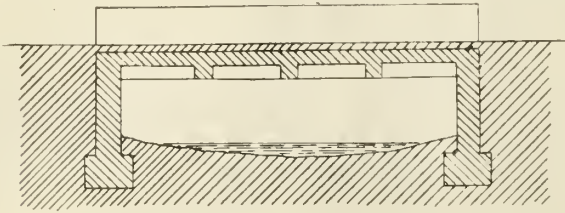
fill. Such a bridge has never been considered anything but a makeshift and when the funds are available, is usually displaced by a bridge with masonry abutments. The cheapest form of concrete bridge is a reproduction of the steel bedstead in concrete. This concrete bedstead bridge still retains most of the objectionable features of the cheap steel bridge, especially for spans of more than twenty feet. In fact, the only defect of the steel bedstead bridge that is eliminated in its concrete successor is the rusting of the legs, not a fatal defect in any event, for such bridges usually fail from other causes long before the legs rust off.

The bedstead bridge in steel is objectionable because it has no provision for expansion or contraction and no proper support for the earth fill which tends to buckle the legs together. The bedstead bridge in concrete retains these same defects. Instead of being supported on stable abutments permitting expansion and contraction of the girder, it is supported on legs, an exact counterpart of the objectionable and cheap steel bedstead. In fact, if the steel bedstead bridge were encased in a shell of concrete the result would be the concrete girder in external appearance. This type of concrete girder is so inefficient in its application of concrete that leg supports are almost essential to make it a competing structure in cost with concrete arches, and even then it cannot be built at the same cost as arches except for the shortest spans, of less than twenty feet, say. Approximately one-eighth of the

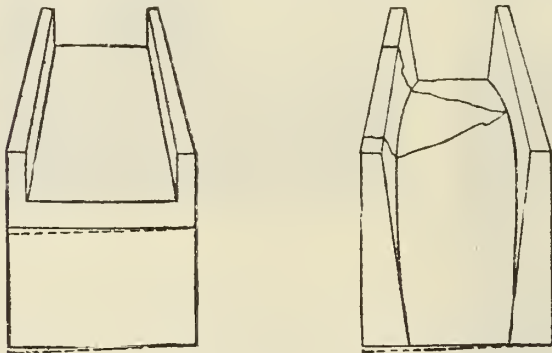
*Presented at the eighth annual Convention, National Association of Cement Users, Kansas City, Mo.

†Consulting engineer, Indianapolis, Ind.

concrete in the girder is doing effective work in resisting compression; the other seven-eighths serve merely as a protective coating for the embedded



Through Girder or Bedstead of Concrete and a Steel Bedstead Bridge



Unequal Settlement As Indicated by Dotted Lines Must Wreck Girder Bridge but not Prove Fatal to Arch

steel. In a concrete arch the material is in much more nearly uniform compression throughout, and economy is therefore attainable with lower stresses and greater safety.

NEW DEFECTS

By building a concrete bedstead bridge instead of a steel bedstead, the rusting of the legs is eliminated

but a much more serious defect is introduced. The support may be removed from under one of the four corners of a steel bridge and the structure still remain standing because of its floor and lateral connections. But in the concrete girder or bedstead bridge any unequal settlement of foundations is immediately fatal. The concrete bedstead bridge has a solid concrete floor slab hung between the two girders. Settlement of an abutment is almost invariably unequal and since the floor connections can-

(Continued on page 57)

Saving The Dust

Charles L. Parsons, chief mineral chemist, United States Bureau of Mines, estimates that in the Portland cement industry, there is anywhere from five to ten percent of raw material going off in the form of dust. He points out that inasmuch as this dust is becoming a menace in many parts of the country, manufacturers are beginning to realize that it is to their advantage to find a means of recovering it before the law compels them to do so. Mr. Parsons says that he knows of one experiment in recovering the dust which amounts to many tons per day, in which the dust is very rich in alkali, some of it having been analyzed and found to contain as high as 35 percent soluble alkali, of which one-half was potash. Mr. Parsons points out that it seems reasonable to suppose that a by-product of potash might compensate Portland cement companies for the cost of maintaining an apparatus to eliminate the dust.

The Portland Cement Company of Utah, Salt Lake City, Utah, has placed an order with F. L. Smith & Co., New York City, for two complete "cylpeb" equipments, to be used in the tube mills on the finishing end.



Mushroom and Girder Systems of Construction: See Article on Page 39

Placing Concrete Under Water at Louisville

Some Interesting Features in Construction
of Water Intake Tower in Ohio River

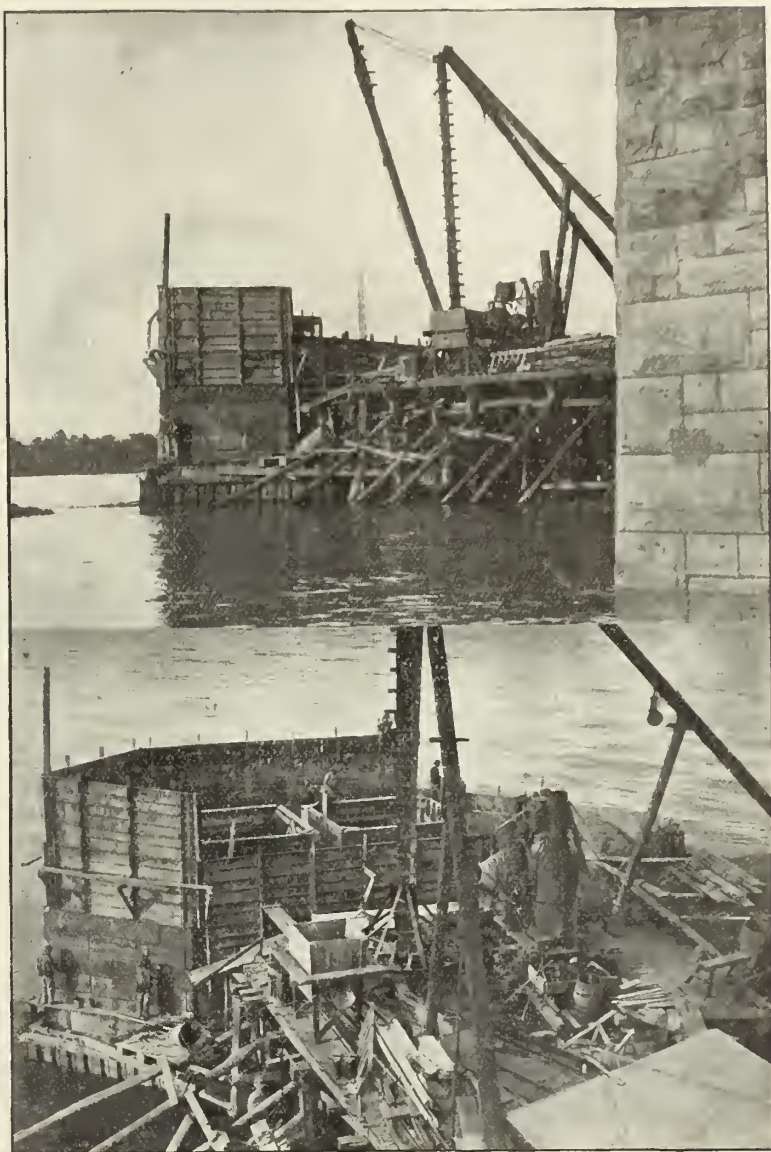
BY G. D. CRAIN, JR.

Work somewhat unusual in design and which presented considerable difficulty after the contractor had begun the work is now being completed at Louisville, Ky. It is the intake and screen tower of the Louisville Water Co., and is located on the Ohio river a short distance above the city. It is built in connection with the pumping station, which has been in use for some time. The change in the low water mark of the river caused by the erection of a dam at Louisville as part of the nine-foot stage project for the stream, as well as the fact that only a single intake was provided, thus increasing the serious aspect of any accidents which might put it out of commission, were factors leading to the decision to construct a new intake system, the cost of which is roughly \$100,000.

The tower was designed by Theodore Leisen, chief engineer of the company. The contract was awarded to the American Engineering & Construction Co., Chicago, Ill. The work was begun a little over a year ago, and is practically complete, all that remains to be done being the laying of the pipes which are to connect the tower with the pumping station. These could be laid at present by the construction of a very high cofferdam between the two points, but as this would involve considerable expense and the stage of the river early in the year is uncertain it has been thought advisable to wait for low water before proceeding with this work. As soon as the river falls sufficiently the cofferdam will be completed and the pipe laid.

The tower is built as a hexagon in plan, its greatest length being 58' over all and its width 26'. The longer sides are 31' 2" in length, and the shorter ones 17'. This form was decided on in order to reduce the effect of the current on the structure, as well as for the purpose of preventing ice, drift-wood and other material from piling up around it, the points being exactly with the current.

The tower rests upon a foundation which is 20' thick and is composed of solid concrete, without reinforcing, except where the walls join it. These are connected by reinforcing bars 1" in diameter and 20' long,



Two Views of Work on Intake Tower

spaced 2' o. c. The walls are 50' high and at the base of the tower are 12' thick gradually tapering on the outside until at the level of the cleaning floor, which is 45' from the floor of the foundation, they are 4' thick, 5' above they are about 3' 6" thick.

It will be noted that the walls are extremely thick, especially in view of the dimensions of the tower over all. As a matter of fact, the space within the tower is only a little over 20 per cent of the total displacement of the building. Little or no reinforcement is used in the walls, except at the base. There is little load on the walls. The buoyant effect of the water,

especially at high levels and with the assistance of ice jams pounding against the walls, would probably have been sufficient, if a lighter type of construction had been used, to lift the tower from the bottom of the river and carry it away or to overturn it.

The weight of water is nearly two-thirds that of concrete. In order to insure the absolute stability of the tower, it was necessary that the volume of the concrete be at least two-thirds of the total displacement of the tower so that its weight would be equal the weight of the water displaced. To provide a factor of safety this proportion had to be increased, so that as a matter of fact the volume of the interior of the space within the shell is, as indicated, only a little over one-fifth that of the total displacement.

The fact that the tower rests on piles and is therefore not as securely fastened as though it had a stone foundation, emphasized the importance of this consideration.

The method used presents an unusually massive structure, and a tremendous volume of concrete, the size of the river considered, was used in its construction. Close to 3,500 cu. yds. of concrete were poured, a rather rich mixture being used for that part of the wall above the low water line, this being in the proportion of 1:2 1-2:5, as compared with a mixture of 1:3:6 for the foundation proper and the extremely thick portion of the walls, lying below the low water line. The extremely massive character of this construction permitted a leaner mix to be provided. River sand and gravel were used, as this was easily obtainable, the Ohio river providing the material. Speed's cement was used.

The tower is divided into two parts by a wall 2' thick and 45' high. This is reinforced with $\frac{1}{2}$ " bars spaced 2' 6" on centers. The dividing wall separates the two influent pipes, and enables one part of the tower to be emptied for purposes of repair, cleaning, etc., while the other may continue in use. The lack of these facilities in the old building was one of the reasons for the construction of the new.

A brick wall 9' high and 21" thick rests upon the top of the concrete tower proper, this being surmounted by a metal roof. The motor equipment to be used in operating the valves of the sluice gates and in raising and lowering the screens, is located upon iron beams at the top of the tower. The screens are of brass and are installed in pairs, so that one may be raised while the other is left in operation. Four double sets of screens have been installed. Each is hung on an independent wire cable, and is raised and lowered by a 10 h. p. electric motor.

Two 6' pipes lead into the tower, equipped with two 4'x6' sluice gates, while the effluent pipes, four in number, are 48" in diameter and are equipped with 48" sluice gates. These lead to the pumping station proper, being connected with 48" cast iron pipes.

Following specifications, the contractors erected a cofferdam of sheet steel piling of the inter-locking variety. This was driven into the river bottom twelve or fourteen feet, a sufficient distance to allow for the

excavation of the foundation without disturbing the security of the piling, which was firmly braced. Preparations were then made to pump out the enclosed space. After the river water had been removed, it was found that underground water (known to be present to some extent, and to pump 2,000,000 gallons of which a day was included in the plans of the contractors) flowed much more freely than had been expected, and also that the pumping of the inflowing water drew out a good deal of sand and was endangering the piling. After this had been continued long enough to show that it would be practically impossible to carry on dry concreting even with the aid of the pumps, it was decided to drive the piles and lay the base of the foundation under water.

Divers were therefore secured and were used in making the necessary excavation and in starting the piles, which were 100 in number, and consisted of 40' white oak timbers. These were 12" in diameter, and were banded at the head to enable them to be more easily driven. It was not found necessary to point or shoe the piles, as they entered the gravelly bottom of the river without difficulty. They were driven to a depth of 20', and were cut off 8' below the low-water line.

WOODEN PILES.

Wooden piles for this work were considered more convenient than other material. The piles of course are protected from the atmosphere and will not rot.

After the piles had been driven the divers were continued in service for the purpose of assisting in depositing the concrete. This was conveyed to the desired spot by means of a tube composed of sheet-steel, the concrete being poured until a sufficient thickness was secured at each point, after which the tube was moved and the pouring resumed. About 6' of concrete was poured before this method was discontinued. Then about ten days were given for setting, and at the end of this time it was sufficiently solid to ring when struck.

The deposit of concrete under water was found to be a process involving some trouble and expense on account of the use of divers, and was of course slower than if ordinary methods had been possible. But by pouring it carefully, so as to enable it to take its position without being stirred about greatly, the mixture settled into place as rapidly as could have been expected and set in excellent fashion, no fault whatever being found in the concrete itself after the setting had been completed.

Following the laying of the first 6' of the foundation of the tower, which of course covered the source of the underground water which had filled the cofferdam, the water was pumped out and the remainder of the concrete poured without the disadvantage of depositing it under water. As long as the foundation was in process of construction, and until the wall had risen some distance above the temporary pier upon which the mixer rested, the concrete was put in place by means of chutes leading directly from the mixer.

After the walls had risen above the level of the Smith mixer, however, the material was then hoisted to

the level of the wall and metal chutes were used in delivering it to the points where it was needed. The concrete was mixed in half-yard batches, and owing to the extreme thickness of the walls was poured rapidly, the method of employing chutes, on account of their short length, being found to serve just as well as though the concrete had been deposited from barrows or other means. Under favorable weather conditions the contractors succeeded in laying 6' of wall a day, although this average was not maintained by any means because of conflicting conditions. Plenty of time was given for setting.

Blow collapsible steel forms were used in the work, two sets being employed and the forms for the succeeding course were placed before those below were removed. The handling of the forms was somewhat difficult on account of the shape of the building, the acute angles formed at the wall junctures being taken care of by the use of filler consisting of metal strips. The tapering of the outside wall, which decreased the thickness of the structure rather rapidly, also made the placing of the forms a more delicate job than it would have been otherwise, so that taking down and setting up the forms consumed a great deal of time. However, had wooden forms been used, it is believed that much more time would have been lost, as the variation in the size of the wall at different points would have made it impossible to use the same forms over again without alteration.

It is worthy of note, too, that while Chief Engineer Leisen specified that wood forms be used, the details of the specifications referring to the preparation of the forms insisted upon the removal of all imperfections, and the use of steel forms met with his immediate approval.

Practically all of the concrete was poured in warm weather, so that there was no difficulty experienced on account of low temperatures. There was no prohibition of the placing of material during weather conditions of the kind, however, except that the engineer required that if this were done his approval be secured upon the methods to be taken to prevent freezing while the concrete was being mixed and after it had been placed in the forms.

A slight addition to the strength of the walls was secured by the use of 8"x8" angle irons, set into the concrete every 6', the anchors being countersunk in the angles.

The intake tower is connected with the pumping station proper by a bridge, one end of which rests upon the tower and the other upon a reinforced concrete pier a few feet east of the pumping station. This pier is only slightly reinforced, however, being of the same massive construction which characterizes the remainder of the work. It rests upon 11 wooden piles, 20' long, which were driven into the earth the full distance. Although at normal stages of the river the pier is above the water level, at high stages it will be in the water, so that the use of piles was to prevent any unfavorable influences being exerted on the foundation of the pier from this source.

The base of the pier is 12' square, and is reinforced with 1" bars. The pier proper is 7' 7" square at the

base and is 4' 7" square at the top. It is 55' 3" in height.

In commenting upon the heavy design used in the construction of the tower, Chief Engineer Leisen said that during most of the time there will be considerable water in the tower, drawn in through the intake openings and that of course would decrease the effect of the outside waters on the structure as far as buoyancy is concerned. On the other hand, as it might become necessary at a very high stage of the river to close the sluice gates and empty the tower, the design had to be with extreme conditions in mind. That meant that the volume of the walls must be at least twice that of the interior. High water, that is to say the maximum thus far recorded, is 45.6' above the floor of the foundation. This will enable the top of the tower always to be a considerable distance above the highest point which the river will reach.

Two Types of Concrete Construction Are Compared

In the construction of the Pacific Mills Print works, on the south bank of the Merrimac river at South Lawrence, Mass., about 25,000 cu. yds. of concrete were put in by the Aberthaw Construction Co., Boston, executing all of the reinforced concrete work in accordance with the plans and specifications of the architects and engineers, Lockwood, Greene & Co., Boston. In general, while standard slow-burning mill construction was used as far as possible, the outer walls being of brick, reinforced concrete was employed in those places where its distinct advantages over every other type of construction were manifest. It is interesting to note that the two general systems of concrete construction used were the beam and girder and mushroom type. The floors and columns for two stories and two basements of the finishing building which is 663' 7 $\frac{3}{4}$ " long by 90' wide, are of reinforced concrete, the mushroom construction is suited as it increases velopes steel box lattice columns with the ordinary hoops tied to radial bars at the column head. As in this building maximum storage space is desired the mushroom construction is suited as it increases overhead room. In the other buildings of the plant, where concrete floors and columns are used, beam and girder construction has been adopted. Practically the entire filter building is of this construction. The accompanying illustrations show a typical interior view of the finishing building with its mushroom construction and an interior view of the central building where beams and girders are used.

In this same connection Lockwood, Greene & Co. recently had occasion to make comparative estimates on the cost of reinforced concrete for a 10-story warehouse 580' long by 109' wide, using beam and girder construction and a mushroom system. Unit prices were obtained from the records of work done in the vicinity in question and were as near correct as was possible to obtain for a preliminary

estimate. It should be noted that the figures below do not include plant and tools or any items that would be common to both systems and therefore should not be taken in any way as an estimate of the cost of the building. The quantities in the following tables are based on one strip of floor 19' 3" wide and the height of the structure. It will be noted that the total cost per strip for the beam and girder system is \$12,616, while for the mushroom design it is \$12,432, leaving a net saving in favor of the mushroom of \$184 per strip, or \$5,520 for the entire building.

The cubic yard price on 1:2:4 concrete is obtained as follows:

Cement, $1\frac{2}{3}$ at \$1.10 net.....	\$1.80
Sand, $\frac{1}{2}$ yard.....	.40
Stone, 1 yard.....	1.00
Labor	1.00
Sundries	.10
	\$4.30 yd.

Columns cost 70c per yard more for labor.

$1\frac{1}{2}$:3 concrete cost \$1 more per yd. for cement, making cost of \$5 per yard, for columns.

MUSHROOM ESTIMATE

Concrete 1:2:4 interior cols....	97 cu. yds. at \$5.00=	\$485
Concrete 1:1- $\frac{1}{2}$:3 wall cols....	34 cu. yds. at 6.00=	204
Concrete in floors, including slab, capitals and wall beams	675 cu. yds. at 4.30=	2,902
Forms for columns.....	6,000 sq. ft. at .12=	720
Forms for column heads.....	40 sq. ft. at 3.00=	120
Interior wall	20 sq. ft. at 2.00=	40
Forms for floor including slab and wall beams.....	21,850 sq. ft. at .08=	1,748
Steel reinforcement (cost includes placing)	51 tons at 34.00=	1,748
Steel lattice columns.....	58 tons at 52.00=	3,016
Erecting lattice columns.....	32 tons at 5.00=	160
Brickwork	11 M. at 18.00=	198
Windows	2,990 sq. ft. at .30=	897
Royalty		208
		\$12,432

BEAM AND GIRDER ESTIMATE

Concrete 1:2:4 interior cols..	75 cu. yds. at \$5.00=	\$375
Concrete 1:1- $\frac{1}{2}$:3 wall cols..	32.5 cu. yds. at 6.00=	195
Concrete in floor including beams, girders and slabs...	550 cu. yds. at 4.30=	2,365
Forms for columns.....	6,300 sq. ft. at .12=	756
Forms for floors, including beams, girders and slabs...	30,600 sq. ft. at .09=	2,754
Haunches	80 sq. ft. at 1.00=	80
Steel reinforcing (cost including placing)	63 tons at 37.00=	2,331
Bethlehem steel cols.....	54 tons at 45.00=	2,430
Erecting	32 tons at 5.00=	160
Brickwork	20 M. at 18.00=	360
Windows	2,700 sq. ft. at .30=	810
		\$12,616

Geo. H. Sharp has been made manager of the Imperial Cement Co., Ltd., Owen Sound, Ont. Mr. Sharp superintended the construction of the Omega Portland Cement Co., Mosherville, Mich., and for the last thirteen years has been general superintendent of the Omega plant. He has had wide experience in the manufacture of Portland cement, and resigned his position to take up his new duties.

Advantages of Flat Slab Concrete Railroad Bridges*

W. H. FINLEY†

Since the introduction of concrete for the construction of railroad bridges no type of structure has met with more success than the flat slab bridge. In the days of stone masonry we were confined to the flat top culvert for openings up to four or five foot spans. Beyond that it was necessary to use the arch type. This meant increased expense in construction due to the cost of cutting the masonry for the arches. For years after the introduction of concrete it was a common practice to use, for small openings say up to eight or nine feet, old railroad rails embedded in concrete to form the top covering. In those days there was more or less second hand rail that could be used economically for this purpose and it was thought that in using the material in this way a cheap and satisfactory structure could be produced. It was soon discovered, however, that second hand rails were not always available and if available they could be put to better use than burying them in concrete for culvert construction. In spans greater than nine feet and up to thirty feet it was the practice, for a number of years, to use I beams embedded in concrete. Among some engineers the idea was to use beams of sufficient strength to carry the live load and consider the concrete only as taking the place of lateral bracing. This form of construction required very careful work in the field, inasmuch as it is difficult to make a satisfactory bond between concrete and large areas of metal, as represented by an I beam, and with the greatest care in the selection of the material and the placing of the concrete it was difficult to prevent it from cracking or separating from the beams. Although there were a number of satisfactory bridges built of this type, yet it was gradually abandoned. As confidence grew in reinforced concrete these smaller openings were built of the reinforced flat slab type. This type not only took the place of stone arches of corresponding span but also at a much lower price. It enabled engineers satisfactorily to solve a great many problems in places where a wide and low opening was particularly desirable. The ideal structure from a railroad standpoint of use is that type which entails the least cost in maintenance. Stone masonry, however carefully constructed, required from time to time re-pointing to prevent the infiltration of water and consequent disintegration of the structure. With concrete properly constructed this maintenance charge is completely eliminated. Not only is the maintenance charge eliminated but the first cost of construction is considerably reduced. In building a flat slab bridge as a monolith it is possible to use less material

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo.

†Asst. Chief Engineer Chicago & North Western Ry. Co.

in the side walls than would be required for an arch of corresponding span.

In railroad construction numerous instances occur in which it is necessary to provide a wide and low opening and this condition is admirably met by the flat slab type of bridge. Before the introduction of this type of construction it would be necessary to provide an arch that would entail very much more expense than the flat slab bridge. Of recent years the flat slab bridge has been used to good advantage in cities where the railroads were eliminating grade crossings by the elevation of their tracks. In the ordinary 66' street where the city permits supports in the center of the street and on the curb lines it is possible to use the flat slab type of bridge for spanning these openings. This results in a very economical form of construction as well as one that can be made aesthetically pleasing in general appearance. It also reduces to a minimum any maintenance expense. A steel structure for a similar opening requires painting every four or five years, and if this work is not attended to the structure soon presents an unsightly appearance. This condition is very prominent in our elevated railroads in cities where the maintenance is not kept up.

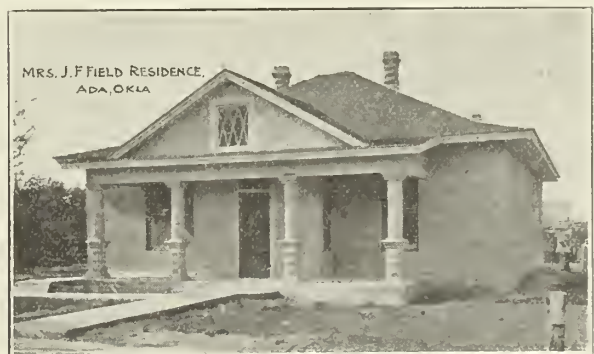
Twenty years ago, in railroad construction, it was the universal practice to use, in openings from six to thirty feet, open deck I beams. These were usually placed upon concrete or stone masonry abutments and presented as much difficulty in maintaining good track as much larger spans for the reason that the dump ties were just as troublesome to keep up as the same ties on a 150' span. I know of no better use for flat slab bridges than in replacing these open floor I beam spans. It is usually possible to remove these I beams and replace them with flat slab bridges, carrying the ballast across the bridge and making a uniform track surface. The I beams can be used for other purposes or they have at least a salvage value that goes toward reducing the cost of the improvement. I have in mind a certain stretch of railroad of about thirty-six miles that has over twenty small openings from six to twenty-five feet made up of I beams with open floors. However carefully the track work was kept up it meant a bad riding track as each one of the bridges represented an unyielding space that was very noticeable to the traveling public.

There is no class of reinforced concrete construction, however, that is entitled to more careful and intelligent supervision in construction than flat slab bridges. When concrete began to displace stone masonry unfortunately the sole idea of constructing engineers was to see how cheaply they could build structures in concrete. Apparently many engineers were so anxious to prove the superiority of concrete in both cost and durability that they frequently sacrificed the latter for the former. It is generally recognized today that to produce satisfactory concrete construction it is necessary to use the utmost intelligence and care in the selection of the materials and the execution of the

work. Unfortunately reinforced concrete construction has, in the past, been exploited from the commercial side rather than from that of engineering. This, I think, was largely due to the various patented types of reinforcing material. Concerns marketing reinforcing material looked upon it from the commercial side only and furnished all sorts of information not only as to the good points of their particular shape or type of reinforcing but also formulae and information as to the construction of reinforced concrete that would apparently enable any one, engineer or not, to undertake the work of designing and building reinforced concrete structures. Happily we are passing out of that stage of development and it is now being generally recognized that it is necessary to have engineers of experience and training to design correctly any reinforced engineering structure.

Inexpensive Concrete House in Oklahoma

The five-room, monolithic, reinforced concrete cottage shown in the illustration was built as cheaply, it is claimed, as though built of wood, stone, brick, or even concrete block. It was built at Ada, Okla., by A. J. Mossman, contractor, under the supervision of J. B. Giles, architect. The cottage was built for \$1,700 and is worthy of consideration by the home builder of the country. It is suitable for any local-



Cost Only \$1,700

ity. The house is most convenient, and has a vestibule, hall, four large rooms, closets, kitchen and bath. The vestibule is 9' in width, and has three sash-window side lights. The front entrance has a large plate glass door. There are two good-sized windows in each room. The house has electric lights and gas, and is modern in every respect. The height from grade line to top of floor is 30", and the ceilings are 10' in height. A low estimate for frame construction of this cottage is \$1,600, but the cost in concrete, \$1,700, included the porch floor, columns, chimneys and walks. "OK" Portland cement was used. The walls are continuous, and have a dead air space throughout. The interior walls are finished in hard plaster, applied directly to the walls without furring and lathing, and the house is perfectly dry. The walls are reinforced both vertically and horizontally.

Pittsburg Concrete Building Collapses after Cold Weather Work

The collapse of the concrete factory structure under construction for the Spang-Chalfant Co., Pittsburg, Pa., February 19, 1912, has attracted the attention of engineers throughout the country. An investigation is being made by Robert A. Cummings, member Am. Soc. C. E. for the Building Code Commission, for the purpose of determining the cause of the accident. The fact that the building was in course of construction at the time when the winter weather was severe, lent a special interest to the investigation.

The building is in the borough of Etna, Pa., near Pittsburg, fronts on Bridge street and is 467' deep and has a width of 100', with an "L" 142' long. This ell is 100' in width and known as the Socket Forge shop. This latter is a structural steel frame building one story high with a concrete roof slab. The main portion of the building, fronting on Bridge street, is principally of reinforced concrete two stories high, and is to be occupied as follows: Beginning at the northwest corner the first 80' is to be occupied on ground floor by the socket tapping department. This portion has a full second floor which is to be occupied by the electrical repair shop. That portion in immediate connection with this and extending southeast for approximately 300' is the machine shop. This has a two-story balcony 25' wide extending entirely around, while the interior portion, 50' in width, is spanned by steel trusses on top of which there is a concrete roof slab. The final 80' is directly connected to the machine shop, but is entirely of reinforced concrete, three stories in height, and is to be used as an office building. This entire building rests on concrete piles varying in length from 23' to 42'. The piles are of the molded-in-place variety.

Plans and specifications for the entire work as well as all details for structural steel and reinforced concrete were prepared by Irvin & Witherow, engineers, Keystone building, Pittsburg, Pa.

February 19, 1912, at about 9:30 o'clock in the morning, the southeastern portion of the building, known as the office building, collapsed. This section fronts on Bridge street 80' and is 100' deep. It is entirely of concrete construction, three stories high. That is, the first floor is directly on the ground except in the rear where there is a 50'x60' basement. The column spacing is 20'x25'. The basement has a depth of 8' 10"; first to second floor 20' 6"; second to third floor 13' 6" and third floor to roof 13' 6". The roof is flat or level and the drainage obtained by cinder fill sloped from front to rear. The maximum cinder fill is 26".

An examination of the premises about two hours after the failure showed that the cinder fill was frozen solid. Cakes which had fallen approximately 50' were found from 12" to 20" in thickness, and containing 80 to 100 sq. ft.

Portions of the roof slab, beams and columns were found which could be broken with the hand

and kicked apart with the feet. Fractures of these parts showed no broken pebbles. The concrete in small sections was mushy, wet and soft. New fractures of heavy sections showed small crystals of ice on the interior. Samples taken at this time and kept in the office until Feb. 26, 1912, containing about 100 cubic inches could be broken with the hands.

The roof concrete was poured from two to four days before Christmas, and the cinder fill was deposited about January 10. The centering had practically all been removed but a few props remained in the second and the third floors. The weather was continually cold from the time of pouring until February 16, when a heavy thaw set in.

The majority of the material fell inward and the columns still standing all point approximately to a common center. The columns still standing show the fracture. The reinforcing steel was of the medium open hearth variety, and shows some remarkable twists and bends. In no case yet discovered has the steel been stretched beyond the elastic limit.

Every indication so far shows that the second and the third floors were satisfactory and substantial and that the collapse was due to the failure of the roof, the falling of which carried with it the third floor and then the second floor. From indications and reports, from men on the work, it is probable that the roof columns failed first.

The design was in accordance with the usual and standard practice, principally of mechanical bond bars. Columns all contained from four to eight bars laced every 12" with No. 3 wire. Roof columns were 12"x14". Girders were 14"x" spanning 25'. The slab was an arch spanning from girder to girder 4" at the crown, and 12" at the haunch, and amply reinforced. The design of the office portion was similar to the balance of the work. The balance of the work, 380'x100', is partially occupied and is proving satisfactory. Since the failure the design has been carefully checked by the engineers, Irving & Witherow, as well as by independent outside engineers of wide experience and all have agreed that the design is absolutely satisfactory and stable.

The New York offices of Underwriters' Laboratories will be consolidated at 134 Williams St., in charge of Dana Pierce. Mr. Pierce has been in charge of the electrical department of the laboratory at the principal office in Chicago the last six years.

Pueblo, Colo., 4/8/12.

Concrete Publishing Co.,
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(Signed) ADAM GRIESEMER,

1102 Crystal Place,

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Vapor Curing of Concrete Products*

Process Described and Plans Shown for a
New System Said to Give the Best Results

BY H. H. BURNS†

The proper curing of concrete products has been a problem to the manufacturer. Concrete must have plenty of water while the initial set is taking place, and moisture should be applied as soon as possible after the product has been formed.

The first method employed, was wetting down with a hose. This has not been entirely satisfactory for two chief reasons, namely: The man employed to do this, did not always get the water on soon enough, or he failed sufficiently to sprinkle all of the product. Perhaps some of the block, brick or tile did not receive any water, and suffered from day to day for that necessary agency in good concrete.

Steam curing has been tried and in some cases very successfully, but as a rule, the product has been done great injury, by using improperly constructed kilns, and too hot steam. The writer has seen steam kilns in which the temperature was at least 300 to 350 degrees Fahr. Such a heat as this can not produce satisfactory results. The temperature should never be over 100 degrees. The virtue of a concrete curing kiln is not in its heat, but in the moisture supplied the product at the time crystallization begins and in a sufficient amount, as a disturbance of this process of crystallization may produce a loss of strength.

Water at 80 degrees Fahr. is on the point of vaporizing, and at 110 degrees the vapor is very perceptible. As water boils at 212 degrees Fahr. the steam rising from boiling water and confined in an airtight room, will produce almost the same temperature, nor will it condense until the temperature drops.

In plants where steam power is employed it is a common practice to blow steam direct into the kiln from the boiler. Steam at 100 lbs. pressure has a temperature of 337.66 degrees Fahr.

Even when this amount of steam is blown into a water tank it produces entirely too much heat.

The term used for kilns, "steam kilns for curing concrete," is misleading and has caused a great deal of trouble, it should be, "vapor kilns." Steam is hot and unfit for the curing of concrete products. Vapor is damp and produces dew-drops when chilled. In constructing a kiln the main object should

be to produce dampness, and methods should be employed to obviate too much heat.

With these principles in view, I have designed a kiln by which we hope to attain the desired results. The plans herewith show a four apartment kiln, and should be located so that other apartments may be added as needed. It is constructed of 8"x8"x16" block made on a tile machine, with a 5" hole running the long way through the block. There are four holes in the first layer of block in the wall, which connect with the 5" core, thus affording communication between the interior of the kiln and the outside atmosphere. All the lateral cores of the wall are left open at each end which allows the outside air to circulate through the wall, thus assisting in the absorption of heat units in the kiln.

A certain number of pipes protrude through the concrete roof; these having a greater area than the cold air inlets, induce a draught. The roof is constructed of concrete 4" thick; metal fabric is used for reinforcement. An arch form covered with corrugated iron is used in making the roof, thus leaving the under side of the concrete corrugated, which prevents the condensation from dripping onto the green product.

Each apartment has two car tracks, each tract 34' 8" long, which accommodate four 8' cars on each track. Between the car tracks is a concrete tank 12" wide and 12" deep, running the entire length of the kiln. In this tank are two 1" pipes. One of these pipes connects at the front end of kiln, with the live steam header, the other to the return header. Each of these pipes connects at the rear end by a return bend. There are no holes in these pipes, permitting steam to escape into the water. The radiation from the steam-heated pipes causes water to evaporate, there being sufficient heating surface to boil the water if necessary.

The tank is supplied with water through a water-pipe placed between the two steam headers, as shown on the drawing, which will prevent the water from freezing in cold weather on its way to the kiln. Its outlet into the tank is provided with a float-valve, which will keep the proper amount of water in the tank.

There is a 6" drain at the rear end of the kilns to carry off the rain water from the roof, also, water from the tanks, if it should become necessary to empty them.

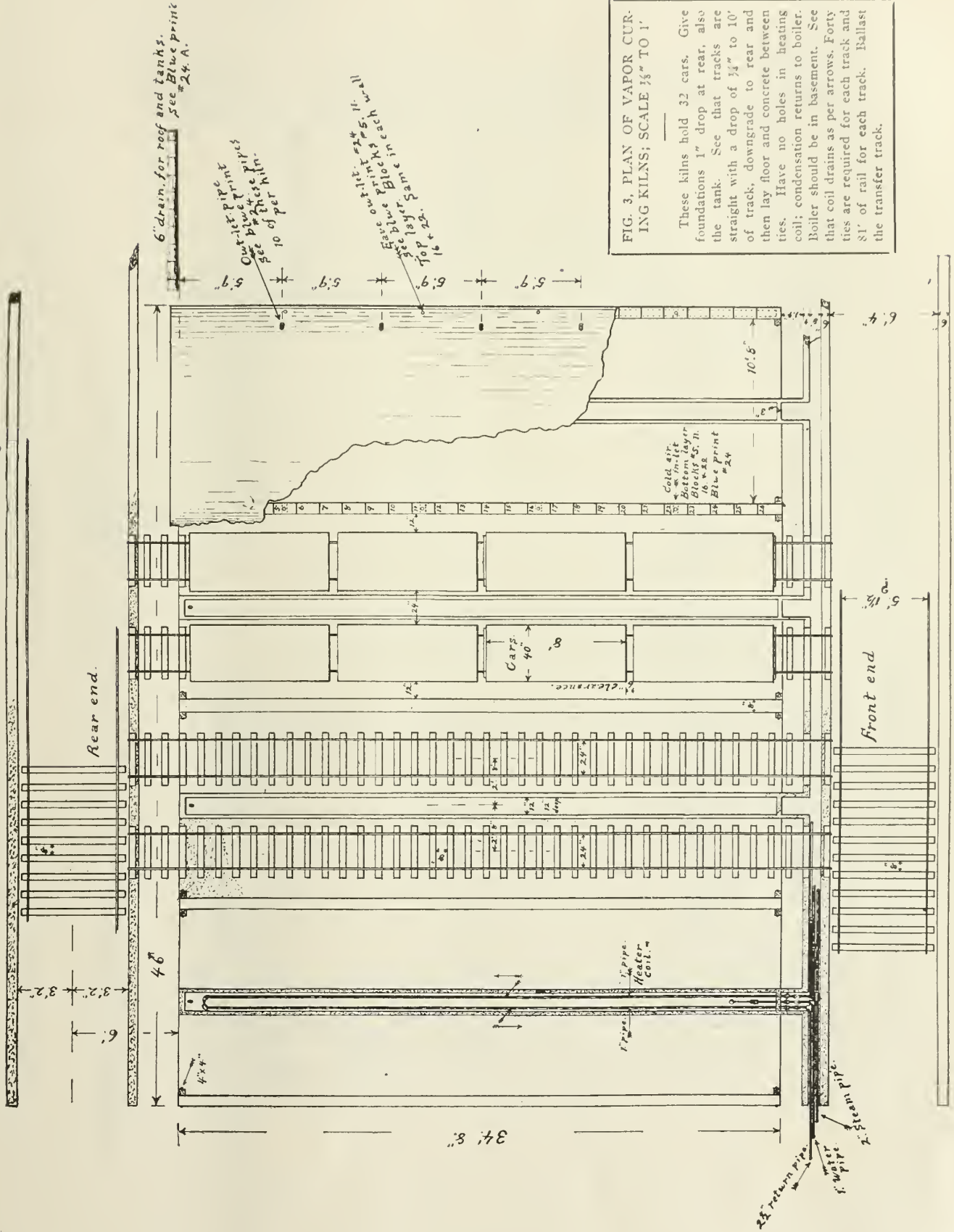
The car tracks have a slight down grade towards the rear end, which enables one man to move the loaded cars. The track is ballasted with concrete, preventing its becoming wavy, as this would entail more power to move the cars. The ends of the tracks

*Concrete is advised by the Besser Manufacturing Co., that application will be made for the protection by patent of the vapor curing process described in this article.—Editors.

†Mechanical Engineer, Besser Manufacturing Co., Alpena, Mich.

FIG. 3. PLAN OF VAPOR CUR-
ING KILNS; SCALE $\frac{1}{8}"$ TO $1'$

These kilns hold 32 cars. Give foundations $1"$ drop at rear, also the tank. See that tracks are straight with a drop of $\frac{1}{8}"$ to $10'$ of track, downgrade to rear and then lay floor and concrete between ties. Have no holes in heating coil; condensation returns to boiler. Boiler should be in basement. See that coil drains as per arrows. Forty ties are required for each track and $81'$ of rail for each track. Ballast the transfer track.



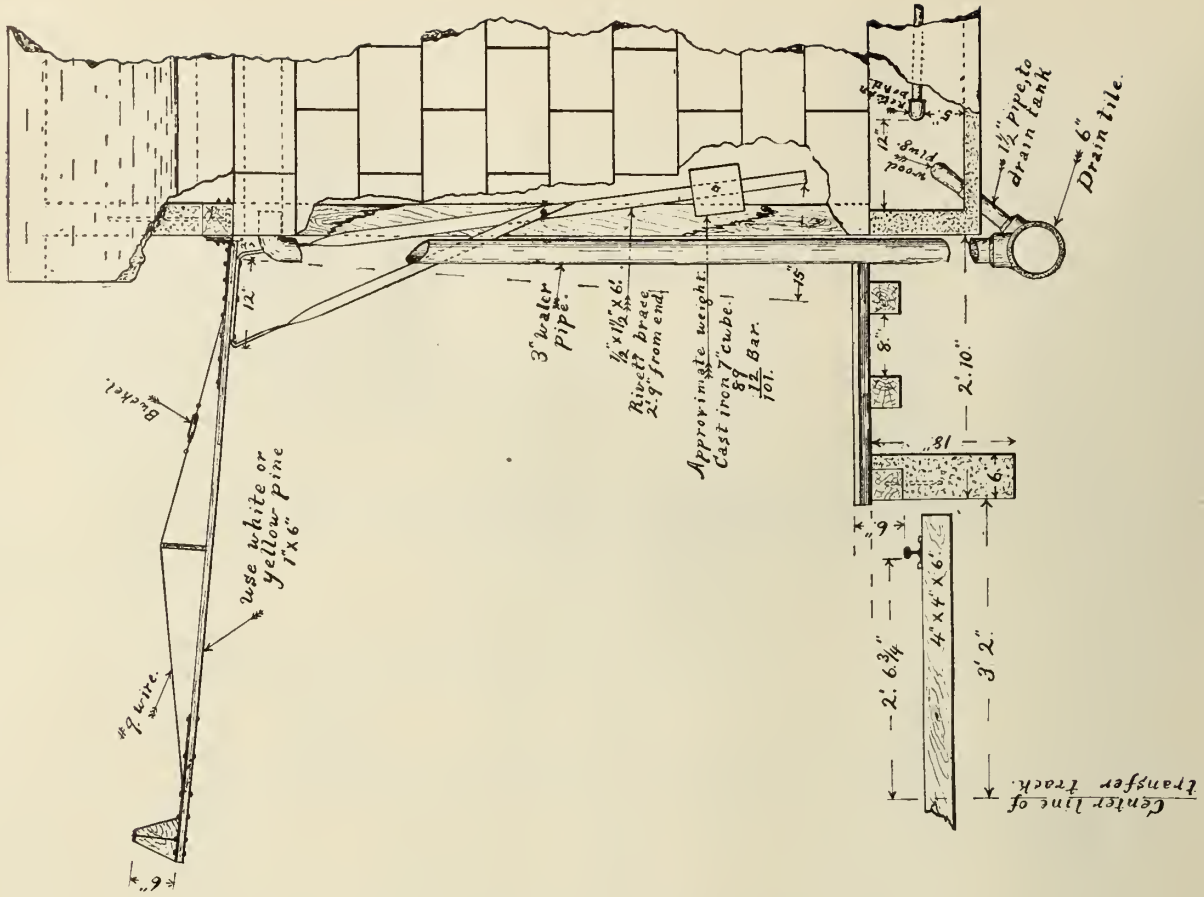


FIG. 5, SIDE OF REAR END OF KILN

Rear end of foundation, water tank and track 1" lower than front; this makes easy down grade for cars and gives sufficient drop to eavetrough and tank.

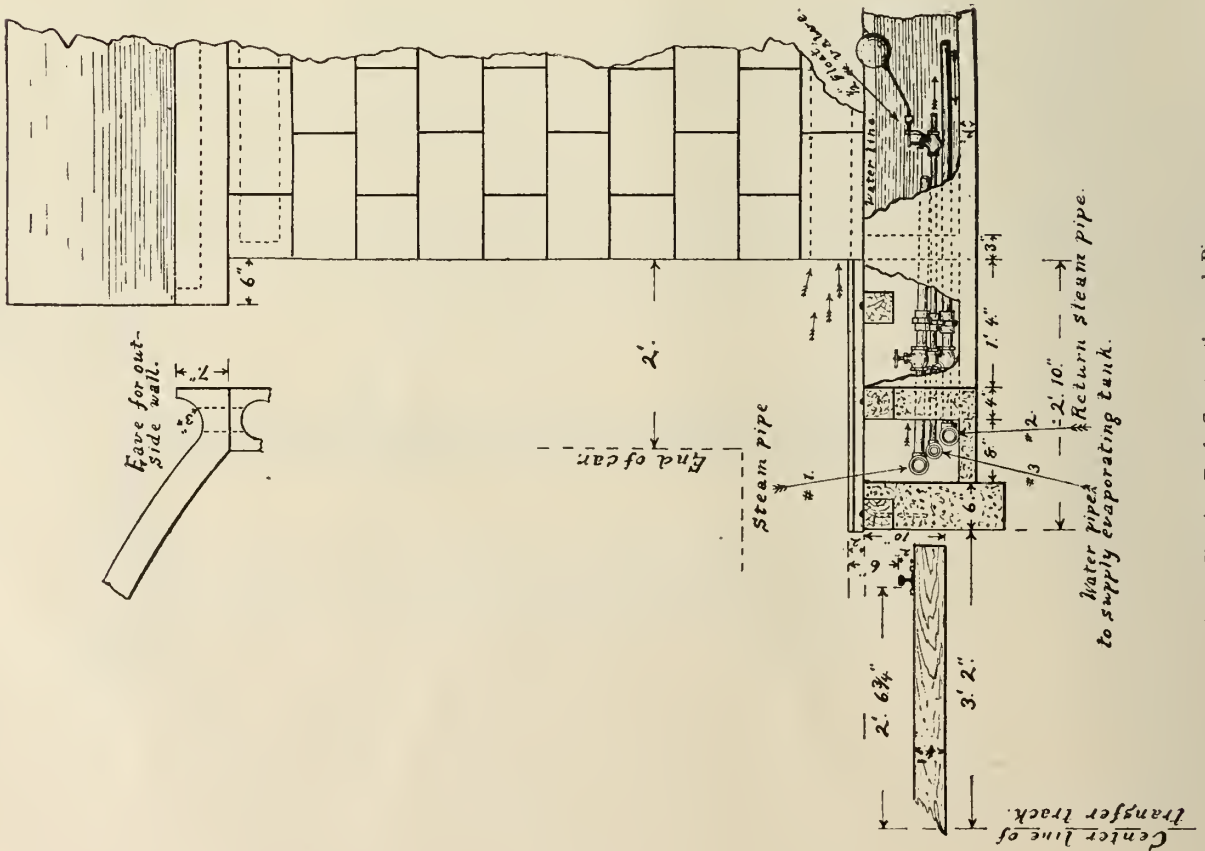


Fig. 2, Showing Tank Construction and Pipes

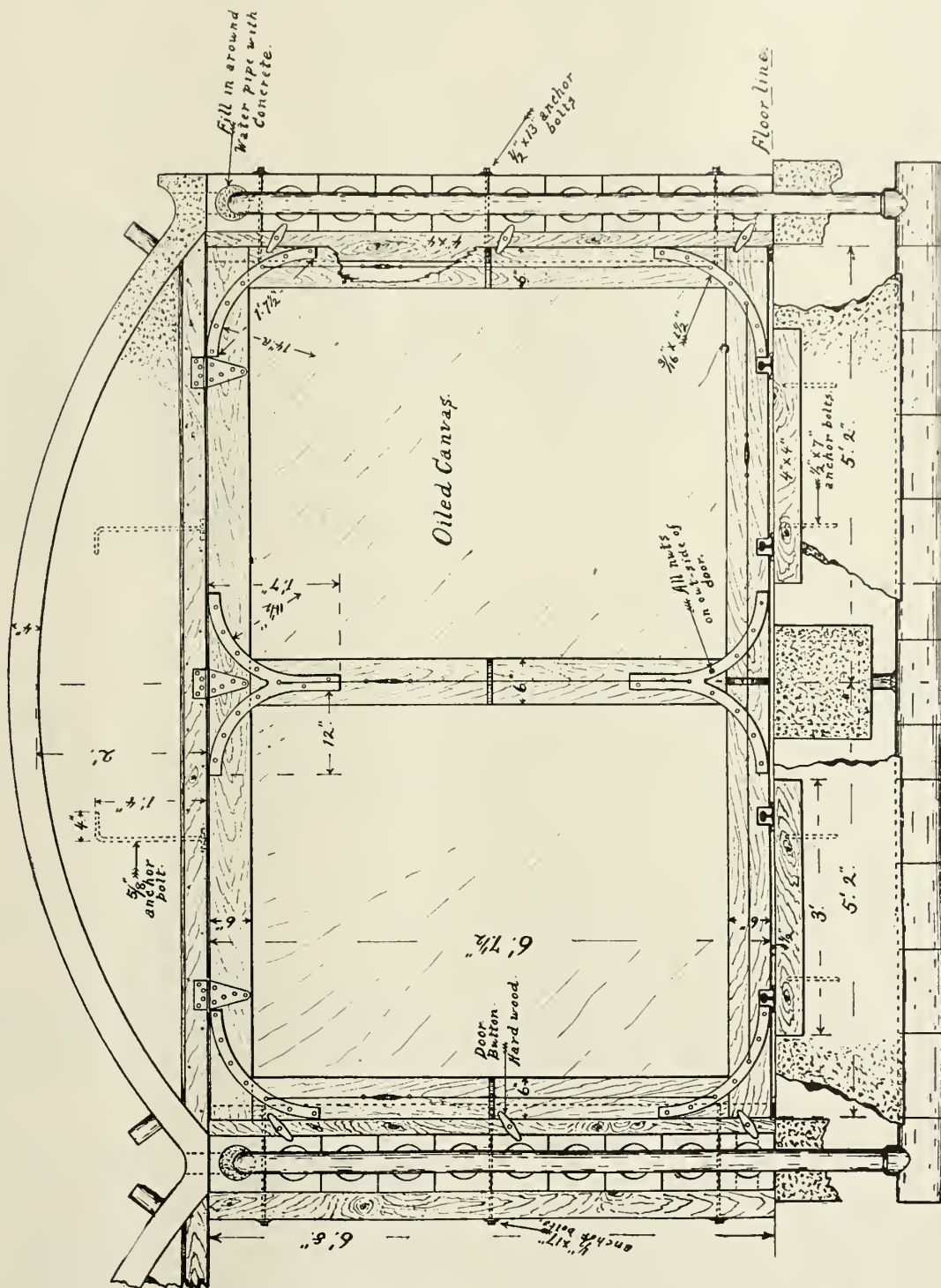


FIG. 4, SHOWING DOOR CONSTRUCTION

Approximate weight of door, 83 pounds; use $\frac{1}{4}$ " carriage bolts for braces, hinges and buttons; bolt counter-weight to middle panel using $\frac{1}{2}$ " bolts; for weight use 7" cast iron cube with $\frac{5}{8}$ " x $1\frac{1}{2}$ " core in middle and set screw.

Vapor Curing of Concrete Products

(Continued from page 43)

rest on concrete walls, thus keeping the rails flush with the transfer car.

The doors are of skeleton construction, covered with oiled canvas on the inside. They are hinged at the top and counter ballanced and when shut they are secured by buttons on each side. This makes a very convenient and tight door. The most important feature of the kilns is the condensation insuring moisture for the product and keeping down the temperature. The hot gases and vapor which arise from the evaporating tank, will be cooled by the outside atmosphere coming in at the bottom of the kiln. The extreme heat rising to the top will be carried away by the vents in the roof. The circulation of the vapor and the cooling process have been carefully studied and take place as indicated by arrows, in figure 1. The cold air inlets and the vents in the roof are located so that this circulation is produced, the area being only sufficient to induce cooler air to enter the kiln, without creating a perceptible current, but, in the proper amount to produce much condensation.

Concrete Machinery in Asia Minor

(From Consul Milo A. Jewett, Trebizond.)

Three years ago a local firm, through the aid of this consulate, imported a small plant of American machinery for making concrete building block. It was a new and untried enterprise in this part of the world. The fact that the manufacturers of the machines, contrary to the too common practice, gave prices f. o. b. Trebizond, was an important factor in securing the order.

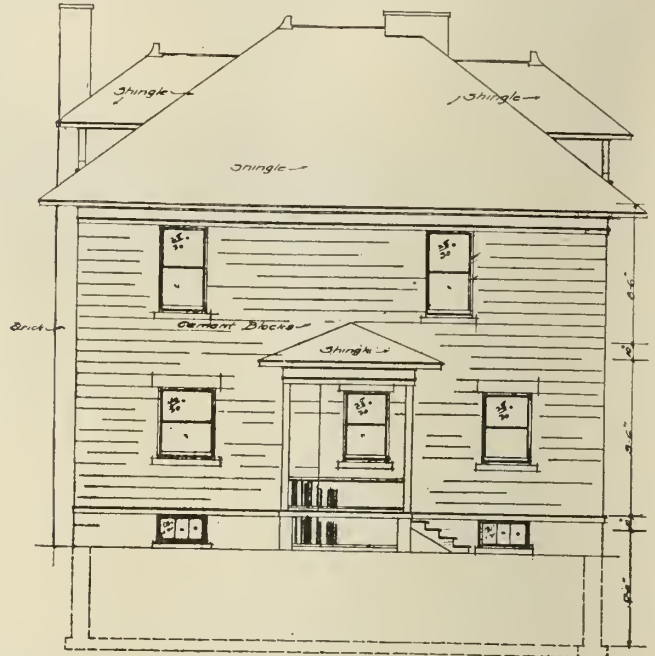
In the beginning people were rather skeptical about this new sort of building material, and the new enterprise had to meet the difficulties inevitable to every innovation, but gradually prejudice has disappeared and now Trebizond has several very creditable buildings made of American concrete block, and the ornamental block are being employed in a number of other buildings constructed of stone and brick. The new Bank of Athens building, centrally located on the most important business street, was built by this firm and is the best bank building in the city and a good advertisement for the concrete construction.

The business has proved so satisfactory here that the firm has opened a branch concrete block factory at Samsun, also with American machinery. There it is expected that a good business will be done, owing to the fact that the Samsun-Sivas railroad has been begun and an unusual amount of building is going on.

It is to be hoped and expected that this pioneer success will lead to more American business in this and other lines. American manufacturers should not despise small orders from a country like this where machinery is little known and every new machine is, in a way, a missionary of modern methods.

Working Drawings for Eight-Room House of Concrete Block

This eight-room Colonial home with concrete block construction for the entire outside walls from grade to cornice line, has a plan which may be worked out most economically for the amount of space which it contains, the house being 32' wide and 30'



Front Elevation, Scale 1/12" to 1'

deep. It can be built on any ordinary city lot, and is particularly suitable for a corner lot.

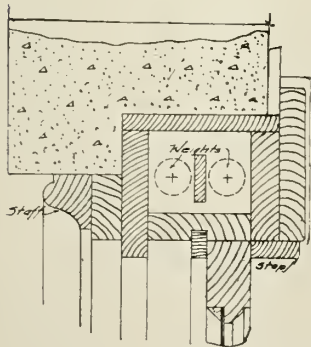
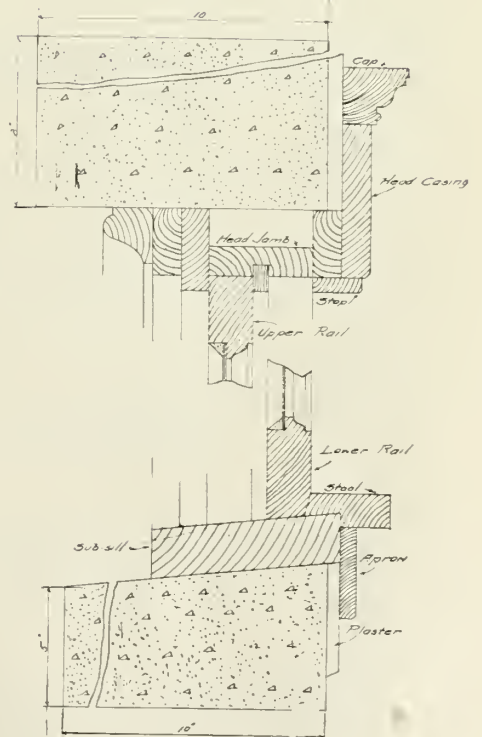
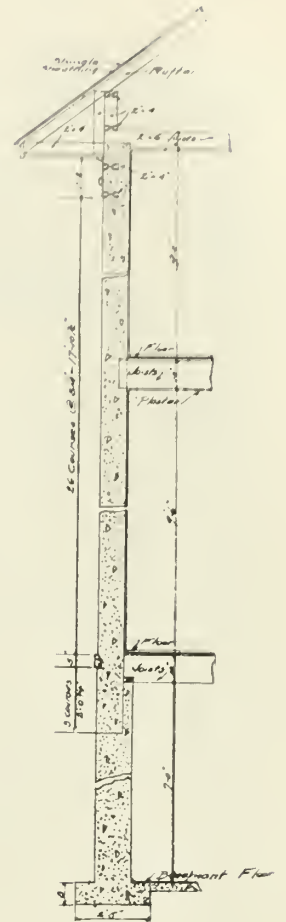
The porch is 10' wide by nearly the full width of the house. The living room, 14'x15', is separated



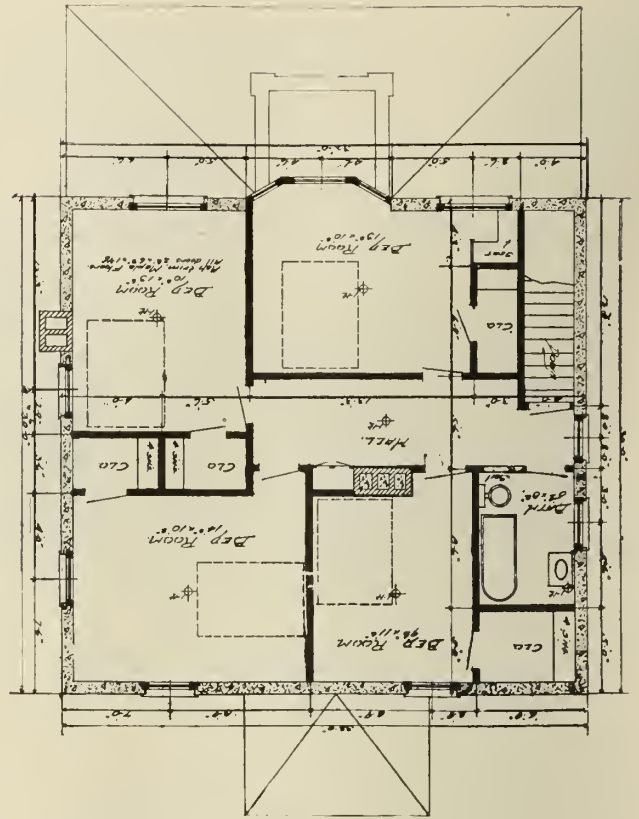
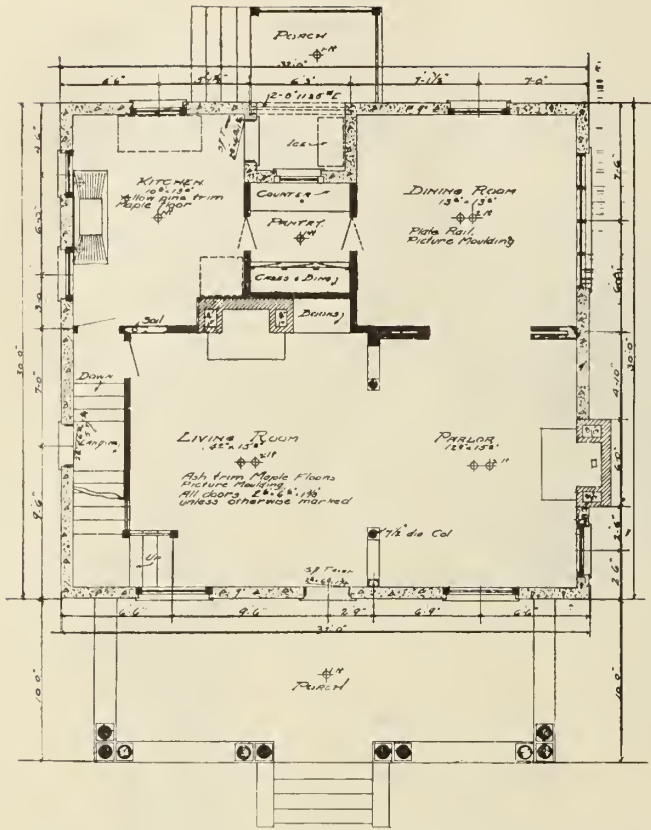
Rear Elevation, Scale 1/12" to 1'

from the parlor, which is 12'x15', by interior columns. The dining room is reached through sliding doors, and is separated from the kitchen by a con-

(Continued on page 50)



Side Elevations, Scale 1-12"
to 1', Wall Section and Box
Frame Details, Scale 1-6"
to 1' for Concrete Block
House.



First Floor Plan—Scale 1/12" to 1"—Second Floor Plan

(Continued from page 48)

venient pantry with an outside window, which has counters, cases, bins, cupboards, etc. There is a large fireplace in the living room and another in the parlor.

Each of the bedrooms on the second floor has a separate closet, and there is also a convenient bath room and medicine cupboard off the hall. The entire house, except kitchen, is trimmed in ash, with maple floors. The approximate cost of the house is \$3,500, itemized as follows:

Excavation	\$3,132
Concrete, concrete block and brick work.....	1,230
Carpentry and interior finish.....	990
Fire places	150
Plastering	200
Painting and varnishing.....	220

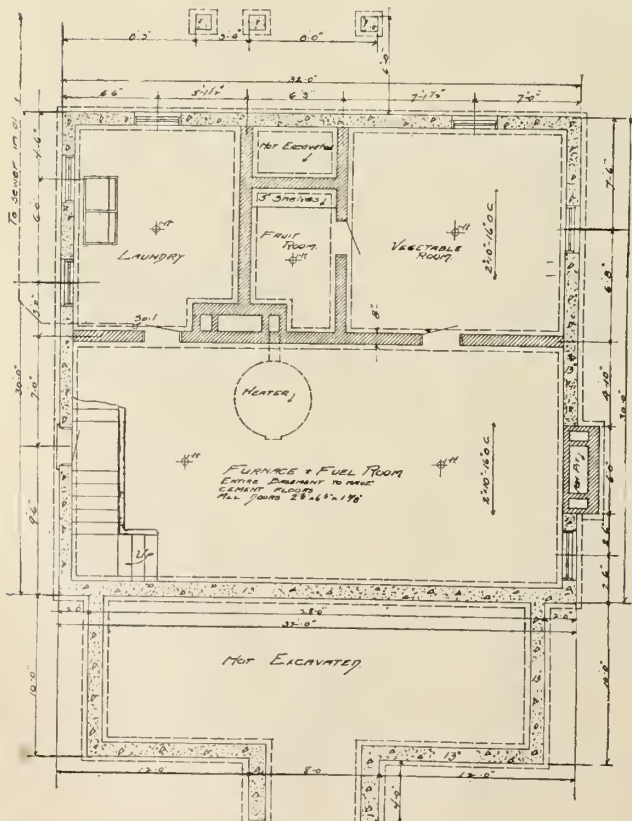
\$2,922

Heating	\$350
Plumbing	300

\$650 650

\$3,572

Plans are from the boards of Jens C. Petersen, architect, Traverse City, Mich.



Basement Plan—Scale 1/12" to 1'

Many Local Organizations Join American Association for Highway Improvement

With thirty-one of the leading good roads associations already affiliated with it, the American Association for Highway Improvement, which was formed in 1910 by prominent officials and citizens for the purpose of correlating the road movement, is now launching a campaign to establish local associations in every locality in the United States that does not boast of one at the present time.

In the year 1911, the American Association formed 140 local associations, the work embracing the States of Tennessee, South Carolina, Virginia, West Virginia, Georgia, Florida and Maine. In the first year of its existence, the association gained 1,000 regular members and 60 sustaining members. The number of regular members is to be increased to 5,000 in the present year.

One of the most gratifying features of the report just issued by the association is the announcement that twenty-one of the leading railroads of the country, in order to aid in the work of stimulating the efforts to bring about a better system of public roads in this country have decided to contribute annually toward the educational work.

The American Association announces that it will continue to strive for wise, equitable and uniform legislation in every state; that it will continue to do all in its power to bring about skilled supervision of roads and the elimination of politics from the management of the roads; and will work towards correlation of the roads, so that those of one state shall connect with those of another state. The Association is also urging the utilization of convict labor in such a manner as to involve the least competition with free labor and to bring about the greatest benefit to society and the most thorough moral and physical development of the convict. In most cases, it is held this can be achieved by using the convicts in preparing road materials or in the actual building of roads.

Thomas Nelson Page, the author, is now in charge of the membership committee and is recruiting several hundred new members each month. Lee McClung, Treasurer of the United States, is the treasurer of the Association, W. W. Finley, president of the Southern Railway, is chairman of the Executive Committee, and is giving his personal attention to the work. Logan Waller Page, Director of the United States Office of Public Roads, is the president of the Association, and he says that it will be the endeavor of all the officers to make this a banner year in the road movements in all the States of the Union.

"It is possible there may be an opening for white Portland cement in this territory," writes Vice Consul T. Percivale Thompson, from Foochow, China. "Chinese buildings such as temples, guild houses and some of the larger shops and residences are highly ornamented with stucco designs and figures."

Prizes Offered for Best Poured Concrete House Designs

The Blaw Steel Centering Co. offers prizes for the best plans and specifications for small concrete residences. The contest is so arranged that the designer is free to express himself in almost any way he chooses, providing the house is of poured concrete and does not cost more than \$3,000. The company, offering four prizes, \$100, \$75, \$50, and \$25, will make the awards on the merit basis, with the desire to get the greatest value in a house to cost no more than the sum specified. Prof. A. D. Hamlin of Columbia University will act as expert judge on plans and specifications. In determining the value of the house design, these things will be taken into consideration: utility, beauty, novelty and fireproof qualities. The prize design will be published in booklet form for circulation among builders to encourage construction in concrete. The contestant may design a house suitable for any location, whether level or sloping ground, and adapted for any climate, and such matters as furring and number of stories and so on are to be determined by the designer. The foundation and the outside walls must be of poured concrete, reinforced where necessary, while floors, ceilings, partitions, roofs, porches and stairways may be of concrete or of any other material. The company requires that drawings shall include the following: Plans of each story drawn to a scale of $\frac{1}{8}$ " to a foot. First story plans shall show the layout of the ground immediately adjoining, but need not show the entire lot. A perspective drawing is also required showing a view at the extreme right or left corner of the house, also to be drawn to a scale of $\frac{1}{8}$ " to a foot. These drawings are to be arranged on one sheet of paper not exceeding 22" by 31", mounted on stiff cardboard. Specifications must accompany the drawings. They must go into considerable detail as to method of construction. The contestant must enclose with the plans and specifications a detailed estimate of cost in which the following unit costs shall be assumed for the concrete work: Reinforcing steel, in place, at 3c per lb.; concrete in place, exclusive of forms, at 20c per cu. ft.; form cost, where Blaw steel forms are used, $1\frac{1}{2}$ c per sq. ft.; form cost where wooden forms are used, 15c per sq. ft. The signature of the designer must be enclosed in a plain white envelope and sent with the drawings and specifications, which are to bear no mark of identification.

If all the paid road officials of the United States were to settle in one city they would provide a population equal to that of Albany, N. Y., Atlanta, Ga., Birmingham, Ala., Bridgeport, Conn., or Cambridge, Mass. The cities mentioned are in the 100,000 population class, under the last census, and the Year Book of the American Association for Highway Improvement, which is just about to be issued, shows that there are about 100,000 officials actually engaged in the supervision of public roads in the United States.

How Portland Cement Should be Stored by Dealers and Users *

Portland cement is easily affected by moisture. It is purposely made so; for, combined with water and other substances, it forms the best of all building materials—everlasting concrete. But moisture must be kept away from cement until it is needed for actual use. This means that cement must be stored in places which are and can be kept absolutely dry. Upon the proper storage of cement are dependent the reputation



Cement on the Work Piled Properly on Wooden Platform

of the contractor or builder, the trade of the local dealer, and the satisfaction of the user.

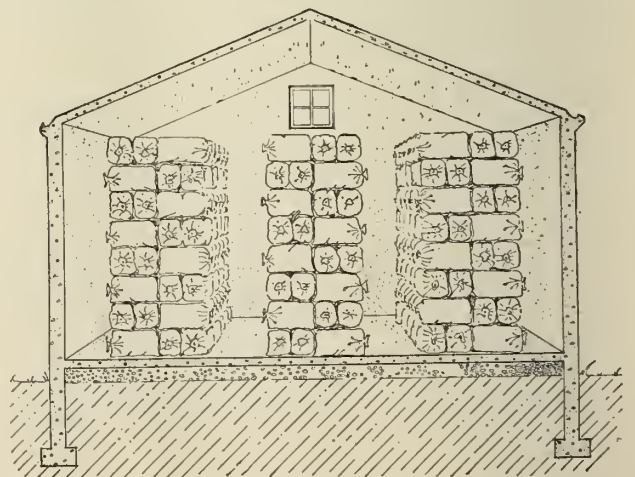
On account of the quantity which they keep on hand, dealers and contractors often build special houses for the storage of Portland cement. Almost any material will do for the construction provided it will shed water and will remain weather-proof. Frequently, for temporary storage, contractors build sheds of "up and down" plank covered on the outside with one or more thicknesses of tarred paper. The floor must be above possible high water and open so that the wind can circulate under it. To make the house more completely damp-proof, the floor should be double or its equivalent. Often the same effect is obtained by a make-shift double floor of loose timbers and boards laid upon the regular floor. For such a temporary shed, there is nothing better than a well-made one-way-slope tarred paper roof on sheathing laid with tight joints lengthwise or in clapboard fashion crosswise. Let the roof have a drip or overhang of at least a foot on all sides. See that it is absolutely water-tight, that the rain cannot beat in under the eaves, and that the roof is fixed so firmly that windstorms will not raise it. It is advisable to put no windows in such a house and to have the door so securely hinged and fastened as to keep out intruders. Where

use of cement in the work is dependent upon acceptance by test, provision for piling should be made in accordance with instructions given for dealers.

The same general principles stated apply to storage houses for dealers. Naturally the house is made more permanent in character. Consequently, it should be supported by a concrete foundation extending into the ground below the frost line. Likewise, for a permanent building, there is no material so good as well-proportioned concrete. Place the concrete floor on sufficient coarse, compacted gravel or broken stone fill to bring the floor level a foot above the surrounding ground. Slope the surface of the floor toward the door. For a one-story building, a 6" reinforced wall is strong enough. With a reinforced concrete roof, the cement will be protected from all possible danger of dampness.

Since Portland cement weighs practically 100 pounds per cubic foot, the beams of the floors elevated above ground must be heavy and be supported at frequent intervals by concrete piers. If window openings are necessary, do not use sash. A strong door hinged at the top and capable of being fastened on the inside is much better for keeping out dampness. Often the building has a solid or skeleton lining on the inside, for reasons given under directions for storing cement. It should be well sway-braced on the inside to prevent springing of cracks or bulging.

The size of the house is dependent upon the extent and character of the dealer's trade. An average car-



Cross-section of Concrete Storage House with Cement Correctly Piled

load of Portland cement contains about 175 to 200 barrels of four bags each. In determining the necessary size of the cement sheds, consider that each bag

*Courtesy Association American Portland Cement Manufacturers.

of cement stored will occupy one cubic foot. Do not build too small. There is an increasing demand everywhere for Portland cement and the trade of local dealers is far surpassing expectations.

The character of the trade has much to do with fixing the size of the storage house. Especially dealers who supply contractors should have sufficient room to keep every shipment separate; for cement used by contractors and builders must often pass a seven or twenty-eight-day test before being used. Moreover, every cement storage house should be large enough to have aisles between the piles of various shipments, so that cement may be removed from storage in the same rotation as it was put in.

Many users of Portland cement need to store it only for the short interval between the time of hauling it from the dealer and using it in the concrete work. Any building with a good roof, tight side walls, and a dry floor will do. Make a temporary double floor by means of small beams or logs and loose boards. See that driving rains or damp air cannot reach the cement.

STORING CEMENT

Portland cement weighs nearly 100 pounds per cubic foot, therefore, judgment must be exercised in loading the floor. Likewise, on account of its weight and possible damage from dampness, do not pile the cement against the side-walls of the building unless the house is full-lined or skeleton-lined on the inside. Store the cement so as to leave an open space or an aisle along the side-walls and aisles at places necessary to separate shipments. Get rid of all possibility of the cement piles toppling over by laying the bags, as a mason would say, "headers and stretchers," that is, alternately lengthwise and crosswise, so as to tie the pile together. Examine the building frequently to see that there are no leaks in the roof or side-walls.

Even on the work, never pile cement on the ground or on bricks. Throw down a few blocks, lay boards upon them and make a dry floor for the cement. Have just enough cement on the work to keep things going. A good tarpaulin is handy to cover up the cement in case of a sudden shower. Always buy cement from the dealer who has a dry store-house. If the cement in the bag has been wet, it is hard as a rock; do not use it under any circumstances. However, do not mistake lumps caused by pressure in the store house for "set-up" cement. Such lumps crumble easily and the cement is perfectly good. Take care of the Portland cement just as carefully after receiving it as a good dealer does, and, properly mixed with sand and stone or gravel, it will yield a building material proof for all time against fire and repairs.

The Santa Cruz Portland Cement Co. has added white cement to its products. The plant at Santa Cruz, Cal., is the only one in the western part of the United States manufacturing white cement, and white cement sells in San Francisco at \$7.00 per barrel.

Why the Retail Lumber Dealer is Becoming Interested in Concrete

BY J. CROW TAYLOR *

There is a very striking illustration of why the retail dealer in lumber is getting more and more interested in cement every year—though it was evidently not originally intended as such—in a recent article by A. T. Gerrans, chairman of the advertising committee of the National Lumber Manufacturers' Association. To show how the lumber industry has been asleep in the matter of advertising and boosting their product, and the gains that cement has made in consequence, Mr. Gerrans quotes the actual record of sales of a concern operating a line of 100 retail lumber yards. The comparative sales of cement and lumber for six years are as follows:

Year	Cement	Lumber
1905	1 carload	166 carloads
1906	1 carload	9 carloads
1908	1 carload	6 carloads
1909	1 carload	5.25 carloads
1910	1 carload	4.5 carloads
1911	1 carload	3.1 carloads

Here is an admission from the lumber producing end that from a ratio of one carload of cement to 166 carloads of lumber in 1905 there has been a remarkable increase in the cement used as compared to lumber in these 100 yards—evidently in the west—until today it is practically one carload of cement to three carloads of lumber. Could one ask for a more striking illustration of the fact that the retail lumber dealer is now greatly interested in cement, and should be interested in cement and concrete literature?

Part of this, as intimated by Mr. Gerrans, is a matter of advertising. Certainly cement would not have made such rapid progress had it not been extensively advertised so as to inform both dealers and the public about its uses. But, no matter how extensively an article is advertised, it must have merit to back up the advertising if it would retain and enlarge the place made for it by the advertising. Otherwise it would make a little flurry and then sink into oblivion. Note in this connection that cement has kept making a bigger place for itself each year, and read there the answer as to whether or not it has come to stay, and is to be a big factor with the retail dealer the country over in the years of the future.

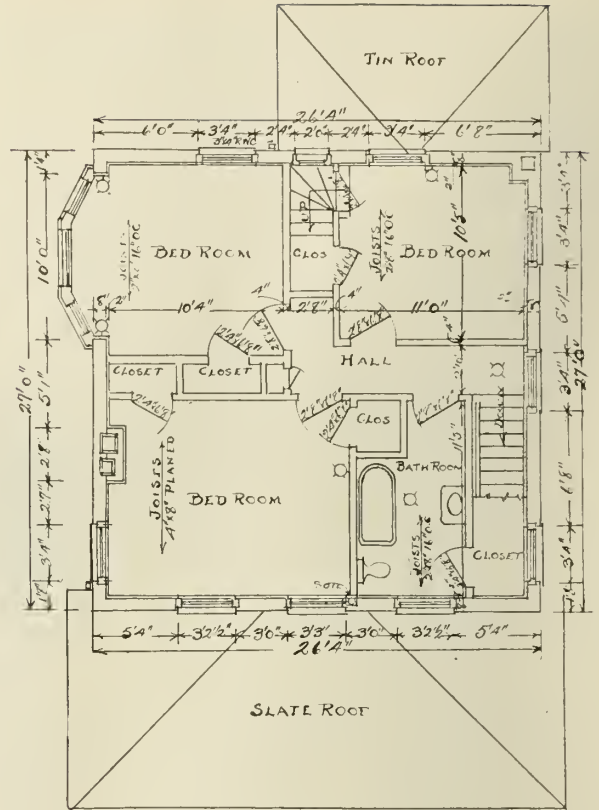
One hundred all-steel box cars are being built for the Bessemer & Lake Erie Railroad, to be used in the steel corporation's cement trade. These cars are of 100,000 pounds capacity, 40' by 9' inside measurement, and 8' high. They are being built by the Summers Steel Car Co., Pittsburg, Pa.

*Secretary Kentucky Retail Lumber Dealers' Association.



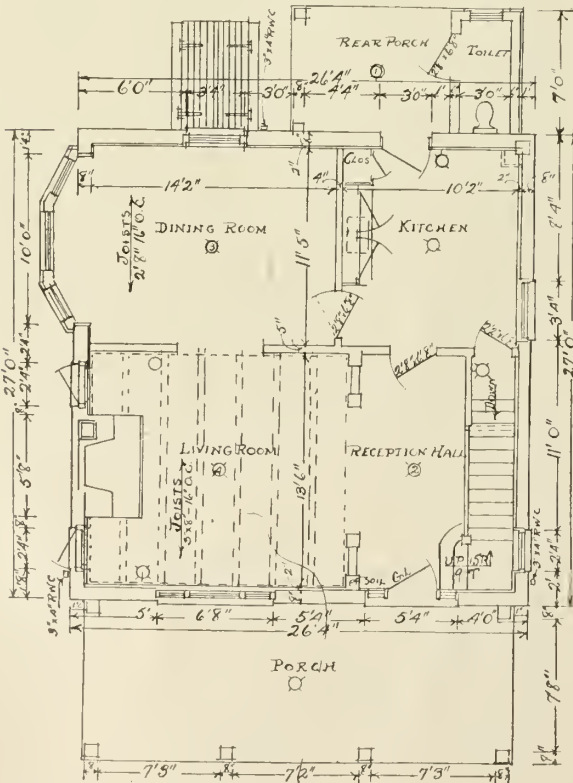
House with Walls of Broken Ashlar Block
for \$3,200

The house shown in the drawings and in the photograph reproduced here was built for William S. Thompson, Westlawn, Reading, Pa., at a cost of \$3,200, the figure including plumbing and electric wiring, but not including heating apparatus. It was designed by Harry Maurer, architect, and is constructed of broken ashlar concrete block, made on a Hobbs machine by the Art Cement Block Co., H. H. Rupp, president, Wyomissing, Pa. The block are granite faced, the facing consisting of 1 part Portland cement to 2 parts mica crystal grit. These block were sprinkled immediately after casting and the surface texture is particularly fine in its spark-



Second Floor Plan

ling effect. The sills, lintels and belt courses are concrete dimension stone faced with white core sand and white cement. The base courses are smooth granite face, bevel edge block, the top course having a water-table design. The roof is of slate.



First Floor Plan

At a convention of the Iowa Ice Dealers' Association at Waterloo, Iowa, in March, a committee was appointed to investigate and report at the next meeting on the use of concrete for the permanent construction of ice houses. This committee is to work in conjunction with the Information Bureau of the Universal Portland Cement Co., and the report is to be published for wide distribution. This co-operation, by bringing together practical ice men and trained concrete engineers should result in a standardization of ice-house construction materials.

Building a Four-Track Subway

(Continued from page 32)

ing section. The form of construction is also similar, except where the line passes by a curve under the present subway in Flatbush avenue. Here the design is of massive concrete arches, one for each track, without reinforcement (fig. 4).

Section 11-A-2, from Sackett street along Fourth avenue to Tenth street, is being built by the E. E. Smith Contracting Co.

Materials for concrete are stored in a yard beside the Gowanus canal at Third street, and are distributed to the work by mule teams. Concrete is mixed in the

roadway, directly over the point of deposit, in five small readily-shifted drum mixers of $\frac{1}{2}$ -yd. capacity, each operated by a 15 to 25 h. p. electric motor. Chicago, Lakewood and Chain-belt mixers were used. The mixture was discharged and conveyed to the forms through 10" sectional chutes of 12-gauge iron, with a funnel at the top.

Generally, the floor and walls of the westerly two tracks were built first, then the floors and walls of the easterly two, after which the roof was carried across all four tracks in sections about 30' long. Five such sections would be in progress at one time.

The necessity for maintaining the cross-bracing of the trench precluded the use of large forms such as were used on certain of the other sections. Forms were made of 2" lumber, dressed all sides, and with lapped

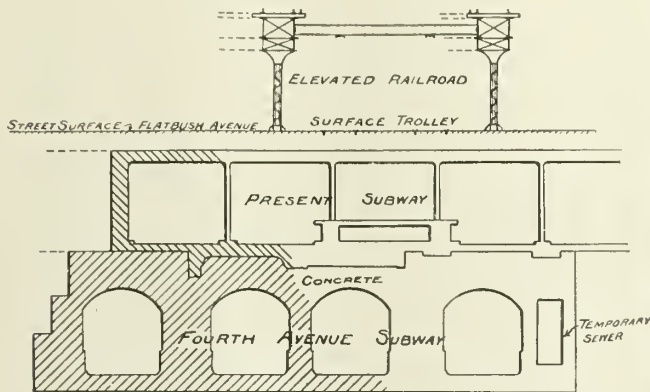


Fig. 2- Typical Section Through Fourth Avenue Subway at Tunnel Under Flatbush Avenue

edges. They were assembled in well braced panels and could be used many times. Jack-arch forms (fig. 5) were made of 16-gauge iron, nailed on wood ribs, and were suspended in position by long bolts.

WATERPROOFING OMITTED

On this section the usual waterproofing on sides and bottom below ground water level is omitted. In such situations the concrete is locally made richer, one to two to four, and the longitudinal reinforcement is doubled (fig. 2).

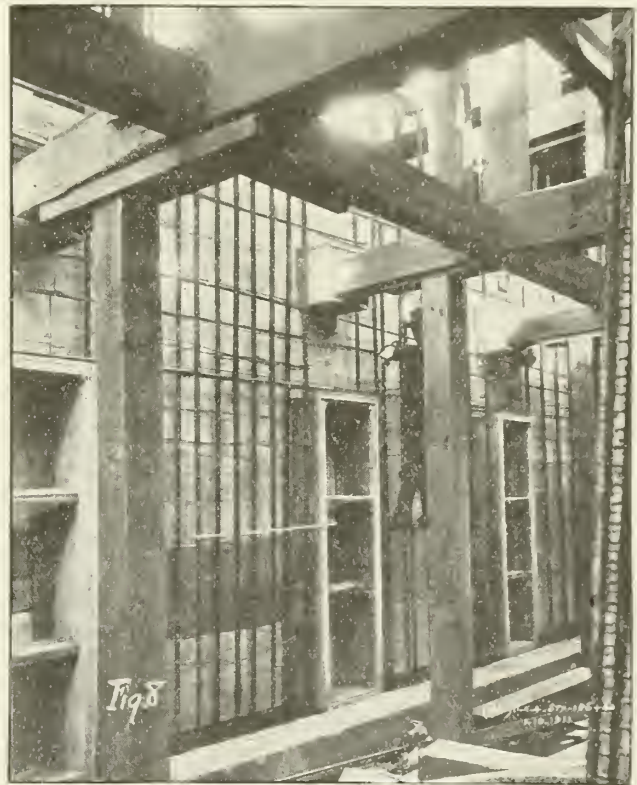
Section 11-A-3, from Tenth street along Fourth avenue to Twenty-seventh street, is under contract with the Tidewater Building Co. & Thomas B. Bryson.

Materials for concrete are brought on scows to a dock at the foot of Nineteenth street, from which a 3' tramway leads to the cut and through it in both directions. The sand and gravel are transferred from the scows to overhead bins by a crane and clam-shell bucket. The bins discharge through gates into 4-yard Continental side-dump cars. These are hauled by a 20-ton American locomotive to the main storage bins, of about 3,000 cu. yds. capacity, situated in the cut near Nineteenth street near the mixing plant. Jeffrey belt conveyors run under the gates of the bins and take the material to a bucket elevator which raises it to bins over the mixer. The overhead bins feed into measuring hoppers, where the cement is added, and thence into the mixer, which is 1-yd. Ransome machine mix-

ing a five-bag batch. Conveyor and mixer are electrically driven.

Taking advantage of the firm character of the ground and the great width of the avenue, a method of excavation was adopted that dispensed with cross-bracing; thus leaving the cut unobstructed and making it feasible to construct large sections at one time. The floor of the two middle tracks was laid first, and this was followed by the floor and duct bench of each of the two outside tracks. Concrete was brought from the mixer for this part of the work in 2-yd. side-dump cars. On the completion of a section of the bottom, steel forms were moved into place, and the sides, intermediate walls and roof were concreted continuously in a long section.

The steel forms (fig. 6) were of the Blaw collapsible type, made of 3-16" plate and stiffened with shapes. They were composed of 5' units, bolted together in sections 40' long, and traveled on rails. Four such sections, one for each track, made up a set of forms; of which two were in use generally on different parts of the work. The forms were struck, each section



separately, by means of a hand tackle arrangement that swung the top leaves down around hinges at each side, and drew in the tops of the side-panels automatically. The vertical reinforcement for the next section being set up, the forms were then pulled ahead, one 40' section at a time, by a locomotive, into its new position; an operation that could be performed in a very few minutes. As each section was advanced it was adjusted to exact position and connected to its neighbor by long bolts and pipe separators. The adjustment was effected by the jack-screws and sliding axles of the trucks, affording a range of movement both

vertically and horizontally. The reinforcing bars of the roof were then laid in position.

For concreting the roof, the mixer discharged into trains of four or more 2-yd. Lockwood bottom-dump buckets on flat cars, which were pushed by a locomotive over the tramway through the cut to the forms. Here the buckets were lifted by a Brownhoist locomotive crane, (fig. 7) and dumped on a hopper raised about 12' above the forms. From the hopper the mixture flowed through shallow troughs to the points required. When both sets of forms were joined together, an 80' section, requiring over 600 cu. yds., could be concreted in about 15 hours.

Section 11-A-4, from Twenty-seventh street along Fourth avenue to Forty-third street, is being built by the E. E. Smith Contracting Co., who are also the contractors for section 11-A-2.

Materials are delivered into bins in the contractor's yard at Thirty-first street and Second avenue, where there is also a cement storehouse of 30 cars capacity to serve both sections.

The methods of mixing and distributing concrete, and the use of forms, are the same as those described for section 11-A-2. Lakewood, Chain-belt and Smith mixers are used.

All cement is inspected at the mills and shipped in sealed bags. The testing laboratory is in Allentown, Pa., in the Lehigh Valley district. Over half a million barrels are required. Alpha, Dragon, Edison, Giant and Pennsylvania brands have been used.

Under the specifications, preference is given to brands the records which show continued increase in strength over long periods. As a criterion of this quality, mortar briquettes are required to show a gain of at least 50 lbs. between 7 and 28 days.

How Benches for Green Houses are Made

(Continued from page 34)

these slabs being formed in the one mold at the same time. The mesh wire is embedded in the flange and then bent up along the side of the mold. To hold the wire in place, four $\frac{1}{4}$ " bars are inserted at regular intervals between the meshes and bent at right angles. Then, covering the flange with a board set $1\frac{1}{4}$ " from the side of the mold, the 10" upright side of the "L" slab is tamped in around the mesh wire and angle iron reinforcement. This double reinforcement of the angle was believed necessary because of the weight of the bottom slabs which eventually rest on the angle with the pressure of the material in the beds against the sides. The double form, however, has provided a most satisfactory elbow.

The end pieces were made in the same mold also, their rounded corners being tamped in at the ends of the mold first and the reinforced length of the slab built up on top of them, its outside surface facing upward. When properly set this slab also is lifted out by means of the plank bottom and placed in the curing rack.

The tapered posts are cast in molds 2' deep, made of wood, the octagonal effect produced by setting

strips of right triangular section in the corners of the mold. The slot $8\frac{3}{4}$ " deep into which the cross beam is fitted is made by fixing an $8\frac{3}{4}$ " strip of wood to one side of the post mold. See figures 1, 5 and 6. These molds are in two sections, each containing two sides of the mold which are locked together by hooks and staples. The posts are reinforced with a single rod which joins the circular base to the octagonal post in the center. The circular base is made first in an adjustable iron band, 2" wide, and the post mold is set on top of the circular base and the rod placed.

Three forms or molds of the same character are used in making the flat slabs. For the posts about a hundred molds are used, the posts being allowed to set for some time in the molds.

MAKING THE LUMBER

In the manufacture of the lumber for these benches the methods employed are not those which would be sanctioned by the most painstaking concrete products manufacturer. As has been said the men doing the work are not specially skilled in concrete work. Exact procedure was not the rule either in mixing the concrete or in curing the bench units. The mixture is approximately 1 part Universal Portland cement to four parts fine gravel. This was not measured in exact quantities but in a wheelbarrow. In making the posts on which the slabs rest some small pieces of broken concrete were put in. The mixture for all the slab pieces is not made wet; it is a crumbly mixture but is well tamped and smoothed off with wooden floats. The mixture for the posts was made wet enough to pour.

The lumber is cured inside one of the buildings which is not kept very warm. Most of the work is done in the winter—most of it in fact in the winter just passed. The pieces are racked up and after two or three days are well drenched with water from a hose. Then they are taken from the racks, stacked up against the side of the building and well wetted down every morning for a week.

The boards on which the slabs rested while being cast and on which they remained while racked are coated with a mixture of linseed oil and kerosene (sometimes only one of these) so that the slab will not stick to the board and also as a means of preventing the board from absorbing moisture from the concrete and warping. The post molds are dipped bodily into a tub of the two oils mixed.

Very few pieces of this concrete lumber have broken. So far as the writer has been able to learn not more than 40 or 50 pieces have broken out of the three and a half miles of benches.

Most of these breaks came when cinders, earth and so on for the flower beds were being taken upon the benches in wheelbarrows.

SETTING UP BENCHES

When it came to setting up the concrete lumber it was found that the work could be done much more rapidly than if boards and nails were being used. The posts were set down in a double row at regular

intervals, the cross beams fitted to the slots, the stringers placed lengthwise over the cross beams and the "Ls" or side slabs set above the post heads and over the cross beams. With a man on either side of the row holding the side slabs in place, a third man fitted the bottom slabs in position over the flanges of the "Ls" and a solid bed was the result. The side slabs needed no bracing, for the floor of the bed held them in position by reason of the weight upon the flanges. The cross beam, 6" deep, plus the stringer, 4" deep, brought the height allowed by the $8\frac{3}{4}$ " slot in the posts added to the thickness, $1\frac{1}{4}$ " of the side piece, up to the floor slabs and the bottom slabs were braced through the middle from the under side.

Without any further reinforcement all the earth and manure needed to fill these new beds was carted over the bottom slabs on wheelbarrows the full length of the houses. In all the thousands of boards thus set up only a few did not stand the strain. These were found to have been improperly cured. With the weight of the earth and manure now in the beds the entire structure is as solid as if it were monolithic, and yet it can be torn down easily. No drains are provided in these beds because of the rough edges between the bottom boards which allow for all the seepage that is necessary.

The average life of a wooden flower bench is about five years. The new method was found to be somewhat more expensive in initial outlay, but this is more than offset by the longevity of the new benches. This company has at present 18,000 linear feet of concrete flower benches and eventually will replace about 200,000 linear feet of wooden construction with concrete in its hundred houses.

The saving in the cost of labor through the use of unskilled men was an item in this work. Six men worked on the molds while two men mixed the cement and sand with shovels. An average day's work for two men at a single mold was from 175 to 200 bottom or flat slabs and cross beams and from 80 to 82 side slabs or "Ls." A big advantage was found in the use of the plank bottoms upon which the concrete slabs could rest in the mold and on the rack until they had become sufficiently cured to be handled without much danger of breaking. Benches in use are shown in figure 7.

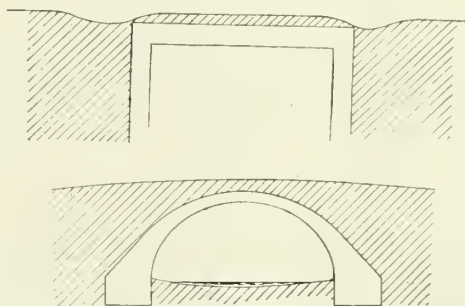
In addition to these beds set up on posts, the same company has built 8,000 linear feet of solid beds. These are built on the ground with no bottom slabs and consist merely of short posts with grooves on two opposite sides receiving long slabs which hold in the earth for the beds. The company employees have now become so proficient in the use of cement that they are making 10" concrete tile to drain the 37-acre tract and they have laid a number of sidewalks and drives among the greenhouses. The floors of all the buildings are of concrete. There is also a large concrete structure like a silo in which manure is steamed for use in the flower beds. Also, a large concrete wall surrounds tons and tons of manure which stand in the open air.

Advantages of Concrete Arch Bridges

(Continued from page 36)

not sustain the heavy girders the floor slab must sustain distortion when settlement occurs at one corner. It must be sheared longitudinally to assume the distorted position. And such shearing will, of course, wreck the floor slab and permit overturning of the girders with complete destruction of the bridge. Any abutment settlement therefore under a concrete bedstead bridge will result in collapse unless the settlement be absolutely uniform. The concrete arch, on the contrary, by cracking in two lines diagonal to one another can adjust itself to any unequal settlement. Such cracks in the arch are invisible for small settlements, are no more objectionable than the joints in stone arches, and are evidenced only by cracks in the spandrel walls which may prove unsightly, but can at least be corrected if necessary by replacing the wall since it is nothing but a retaining wall for the earth fill of the roadway.

An 80' arch at Pasadena, Cal., settled 8" at the crown due to lack of balance of adjacent arch thrusts. The settlement continued for several months until it was finally stopped by placing a support under the crown. At South Bend, Indiana, an arch of 120' span settled 6" over night during construction and is now in use in that distorted condition with no visible evidence of its misfortune. At



Effect of Soft Roadway on Girder and Arch

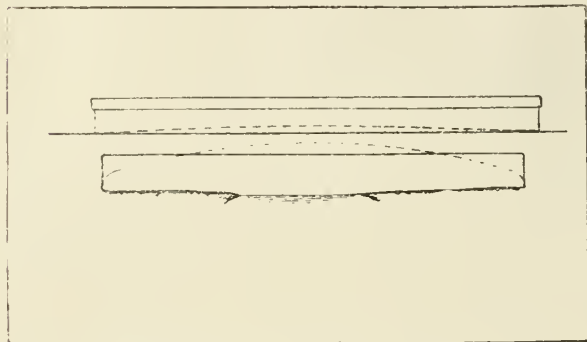
Jacksonville, Fla., two earth filled arches of approximately 60' span each, resting upon an intermediate settling pier, have been jacked up 18" as the pier settled. Very few complete collapses of arch bridges have occurred and those few have been due mostly to undermining floods. Whereas numerous unexplained failures of well designed girder bridges have been reported. The evidence seems to be conclusive therefore that it is the concrete arch that is best adapted to soft foundations and can even be jacked back to place, and that it is the concrete girder bridge that ought to be built upon rock foundations rather than the arch.

It is sometimes urged that the horizontal thrust of the arch renders it objectionable for soft foundations. But this is an element that can be easily provided for by any proper study of the foundation conditions. One might with equal propriety contend

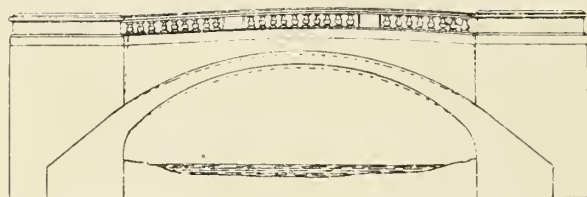
that the great compression in the extreme fiber at the middle of the girder was an objectionable feature of the girder. The one can be provided for by the expert as readily as the other.

GIRDER FAILURES SUDDEN

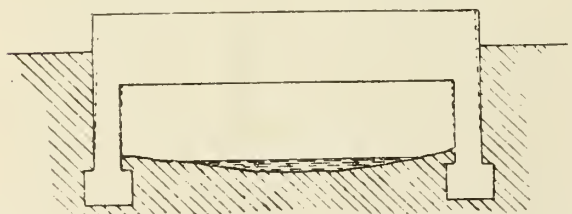
Arch failures occur slowly and with abundant warning. Girder failures occur suddenly and usually without any warning whatever. There are numerous instances of cracked arches still standing and



Comparing Arch and Girder for a 60' Location



Effect of Temperature Changes on Concrete Arch Bridge



Effect of Temperature Changes on Concrete Bedstead Bridge

doing good service. But the cracked girders have almost invariably been followed by collapse.

The reinforcement required for a concrete bedstead bridge is a mass of intricate detail requiring the greatest care on the part of the builder. Whereas

the reinforcement for a concrete arch is simplicity itself. Since an arch contains but a small amount of steel and requires that only for live load stresses, the concrete arch will increase in strength with age as the concrete hardens. The concrete girder relies for its strength mainly upon the embedded steel even for the dead load stresses, and does not therefore increase in strength with age. Moreover, the compacting of the earth fill over the arch is a source of strength whereas it is an element of weakness in the bedstead bridge. The roadway width over a concrete arch can always be widened without destruction of the original structure. In the case of the girder bridge with its roadway suspended between the two girders, the increased width can be secured only by tearing down the original superstructure. And since such a bridge cannot be built to advantage with a wider roadway than 18', which will not be sufficient in many communities in fifty years, such a bridge lacks a great deal of being a permanent improvement. An arch may be built with narrow roadway and the cheapest of finish and with no ornamentation, to suit the present needs of a community since at any time the growth of a community in traffic and in value may be provided for by adding increased width to each side of the roadway of the arch, modifying at the same time the ornamental treatment to suit the growth of the community. Such additions to the arch structure will, of course, completely hide the arch as first erected.

The waterway area of an arch is always greater than that of a concrete beam or slab bridge in which the roadway is carried upon the girders. But when the roadway is carried between the girders, the advantage is in favor of the girder bridge, although not as great as is generally supposed since the rectangular opening is not as effective for flood discharge as the arch opening. This will be clear from a consideration of the three possible types of waterway openings, V-shaped, rectangular and A form of equal area. The V-shaped opening is suitable for sewers in which rapid flow is desirable for carrying solids. But it is ill adapted to bridges because it restricts the waterway at low levels, thus damming it back and producing a flood and because it requires a long span. The A opening is the other extreme, susceptible of being spanned by an arch structure of shallow depth at crown and having a long span at the lowest level to carry flood waters away before they can be dammed back. It has the lowest center of pressure and will discharge most at any flood level. It, moreover, provides an opening for ice or debris at a higher flood level than either of the others. It will usually be found, therefore, that while the arch may have 10 to 20 per cent less waterway than the corresponding bedstead bridge, its flood capacity is not by any means limited to the same extent. An arch is properly cambered about one-tenth of an inch to the foot of span for appearance. This camber further increases the possible waterway opening. The objections sometimes made

(Continued on page 64)

INFORMATION DEPARTMENT

Inquiries regarding sand and other material are cheerfully answered, like all other questions, but in cases of importance it is best to invest in a laboratory analysis. Write to us for particulars, address, Laboratory Department.

Curing Block

One of my customers has asked me for information on curing concrete block by steam. Can you give me some information along this line? R., New York.

See answer to B., Texas.

* * *

Steam Curing

Please refer me to some information on the subject of steam curing. A new building code has just been adopted and no provision made for block cured except under natural conditions for 28 days, with sprinkling. I would like to convince the city fathers that steam is better. B., New York.

See answer to B., Texas.

* * *

Sewer-Pipe Machine

I am very anxious to get the address of a company which manufactures a sewer pipe machine with automatic tamper and revolving table. I remember seeing the advertisement of one in your paper more than a year ago, and as I remember it, the name was something like Win or Quinn. H., British Columbia.

We have pleasure in referring you to the Quinn Wire & Iron Works, Boone, Iowa. This company manufactures a pipe machine of the type in which you are interested.

* * *

Sand, Samples of,

I am sending you two samples of sand. Please give me your opinion of them for use in making concrete block. The white sand is suggested for facing the block. M., Texas.

We are sorry to say we are not very enthusiastic about either one as a material for making concrete. The white sand is altogether too fine and contains considerable dust which is emitted in clouds, when the sand is run through the fingers. The red sand is not well graded. It contains some gravel of fair size but the bulk of the material is very fine, and in addition, it contains some dirt and some lumps which are readily broken and which undoubtedly would make soft spots in concrete. Of course, the dirt could be removed by washing, but we think the material is not well graded as it is.

* * *

Iron Borings and Salamoniac

Please give me some information as to the use of iron borings and salamoniac in waterproofing and as a filler for concrete. K., Ohio.

The use of iron filings and borings in connection with salamoniac as an electrolyte to accelerate the oxidation, was first practically used back in the seventies,

and has been covered by various patents. The purpose of the addition of the iron was primarily for waterproofing, and also for increasing the hardness, density and strength of the various cementitious compositions in which it was employed.

Modern application of this principle is found in the products of the Ironite Co., Chicago, Ill., the Master Builders Co., Cleveland, O., and of other manufacturers, who are supplying a finely ground pulverulent, atomized, metallic iron, which in its natural characteristic to return to its lithargic union with oxygen, increases its volume, filling out the pores of the concrete in which it is used, and imparting a density that insures waterproofness.

It is very obvious that in order to contribute this condition of density, it is absolutely essential that the iron be distributed in the form of very finest minute particles, and that the simple addition of iron filings or borings will not accomplish this purpose. In fact, an iron filing or boring will only oxidize superficially and tend to create a layer of oxide that will insulate the main part of the boring of iron from the concrete.

Consistent with the correct conception of the behaviour of metallic iron, the fine division is absolutely essential, supplemented with the most even uniform distribution, and the application of plenty of water to thoroughly oxidize and develop the product.

* * *

Apple Storage Building

We expect to erect a building of concrete block in which to store apples. We have erected many other buildings, including grain warehouses, etc., of concrete block, but we would like to know something about what strength a wall should have for an apple storage building which we are now going to put up. The building which we propose to build is as follows: It shall consist of two shells—one outside of hollow 8" block and one inside of solid 8" block, with a 5" air space between walls, and the walls tied every sixth course. C., New York.

You are of course aware that it is a difficult and sometimes a dangerous thing to give long-distance advice in the matter of industrial construction, even when all the known factors of the problem are given. In general, the type of construction you name is very satisfactory for cold-storage warehousing. The hollow wall is of great insulating value, if care is taken to insure a dead air space. This is best done by laying the footings and foundations in mass concrete, and laying the wall as you suggest. At the top course in the wall, provision should be made for sealing the construction hermetically either by a course of solid block or by inserting a metal plate of sufficient width entirely to cover the space between the two walls.

Without knowing the thrust on the walls we cannot say whether or not the metal wall-ties every

sixth course would be sufficient, but unless some extraordinary pressure is to be withstood, it ought to be strong enough. Our preference would be for construction with beams bearing on the wall itself. We regret that we are unable to be of greater assistance to you at this distance.

* * *

Repairing Basement Walls

I shall have to do some patching on my basement walls and I would like to know something about how to do it. A small amount of moisture comes through the walls as they are (the walls being built of stone), and I want to prevent it. I should also like some information about a waterproof paint to use on the walls. Will you also tell me what mixture I should use in making laundry tubs of concrete? B., Kentucky.

We suggest that you read an article by Ernest McCullough in the January issue of CONCRETE.

It is not always an easy matter to do this work, and the way to do it depends altogether upon the conditions, of which it is impossible for us to judge at long range. As to the paint to use on concrete, we refer you to the advertisers in CONCRETE.

If you expect the plaster to stick on the stone walls, we suggest that you rake out as much of the mortar from between the stones as possible (to a depth of $\frac{1}{2}$ ") so as to leave crevices in which the stucco will bond. Make a sticky mortar first of sand and cement in a proportion of about 1:2 of cement and sand and press this firmly against the wall. Before this sets, scratch it over with a trowel and then put another coat of mortar on top.

It is very difficult to tell what mixture should be used in making laundry tubs because so much depends upon the thickness of the walls of the tub and the nature of the material of which you make the concrete. If you use a mesh reinforcing, which probably will be best if you do not want the tubs too heavy, the concrete will have to be made of rather fine aggregates; that is, it should not have stone in it which are larger than $\frac{1}{4}$ ". This should be graded down to fine sharp sand. A mixture of 1:3 cement and sand should be about right.

* * *

Repairing Old Floor

I am called upon to repair a concrete floor in a meat market. The floor is perfectly level around the four walls but at various places in the center there are holes from two to five inches deep. The owner wants a new coating all over the floor without taking out the old floor. The floor cannot be raised more than $\frac{3}{4}$ " and it is very greasy. How am I to go about it to repair this floor and put on a new top coat? B., Michigan.

The best practice says that when a top finish is to be put on a concrete floor, the base of which is already hard, the finish should be at least 1" thick, so that it will have considerable strength in itself, so if you insist that the floor which you are going to put on is to be only $\frac{3}{4}$ " thick, it seems to be obvious that you are taking chances. Can't the man get along with a quarter of an inch less head room so that you could make this surface 1" thick? Of course, floors have been

put down in which the finish was only $\frac{3}{4}$ " thick, and if you do the work very carefully, you probably will meet with success.

The first thing to do will be to clean the existing floor thoroughly. The chances are that a floor in a meat market will, as you say, have absorbed a great deal of foreign material which will be a disadvantage in securing a good bond between the new coat and the old floor. You should go over the floor with muriatic acid and water in a solution sufficiently strong to eat off all the foreign material and etch well into the old concrete. The soft or grainy places in the floor should be carefully chipped away. The acid should be washed off thoroughly with clean water as soon as it has done its work. The floor should be well wetted before the new floor is put on.

This should be a mixture of 1:2 cement and sand, which is well graded, with clean, hard grains, and it should be well pressed into the present floor, but, at the same time, you should not do any more troweling than is absolutely necessary to get a good finish, because troweling will bring the finest particles to the top and will not make a good wearing surface.

* * *

Concrete Fence

Can you give me some information as to building a concrete fence for a small bungalow? Any ideas along this line will be appreciated. L., Illinois.

We are sure we can be of some service to you, but we could get at the matter more directly if we had a better idea of the kind of fence you would like to build.

How To Use Concrete, a book which we publish and which retails for \$1.00, devotes several pages to the subject of fence post manufacture, but we are not sure that you intend using ordinary fence posts in your work. Probably you will want something more ornate than concrete posts with wires attached. The information contained in the book, however, will be of great service to you if you intend to manufacture the fence yourself, because the instructions as to mixing, molding, curing and so on would apply to almost anything along this line which you undertook.

The magazine CONCRETE has published considerable information from time to time on the construction of concrete walls and fences of various kinds. In the February, 1910 issue of CONCRETE, a description with detail drawings of a concrete picket fence was published. In the issue of CONCRETE of January 1911, we published some pictures of concrete walls and gateways which might be an inspiration. In the November, 1911, issue of CONCRETE we published a picture and description of a concrete wall built around Old Fort Johnson, Akin, N. Y. In the February, 1912, issue of CONCRETE we published some information as to a concrete fence built on the farm of O. C. Barber, Barberton, O. If you are going to build the fence in small units and set it up, this article in the February issue will, undoubtedly, be full of suggestion. On the other hand, if you want to build a concrete wall you

may do it out of concrete block (numerous block machines are advertised in CONCRETE), or you may make it out of specially cast pieces, the molds for which you might be able to make or have made to your own design, or you could erect forms on the spot and pour the wall monolithic. We suggest that you look at the advertisements in CONCRETE of fence post machines. If the products of these machines do not meet your special requirements, special molds can be made to turn out concrete fences which are very attractive. So far as we know, ornamental fences of concrete are made from molds specially designed, and which are not to be purchased in the market.

* * *

Steam Curing

Please give me some information on steam curing and the construction of a steam curing plant for concrete products. B., Texas.

Steam curing of concrete block, concrete tile, dimension stone and other concrete products insures stronger products and more uniform products. In a plant sufficiently large to warrant the installation of a steam curing system, it will result in great economy, because it is possible to get the products through the plant and on to the work in a much shorter period of time than when sprinkling and natural curing are practiced. It is a great advantage for a manufacturer to be able to make concrete block for instance, and have them ready for transportation to the job in the shortest possible time. If it is necessary to sprinkle the block inside of a building for seven days and then leave them in the open for three or four weeks more before they can be placed in a wall, it is obvious that a manufacturer has to keep a long way ahead of the demand for his material. A concrete block which has been in the steam curing chamber, properly constructed and equipped, for a period of 48 hours and then allowed to age outside for a week is a stronger material for building than a naturally cured block three weeks old.

In the proposed recommended practice for making plain concrete drain tile which is being presented for letter ballot by the members of the National Association of Cement Users, it is said under the heading, *Natural Curing*, that tile shall be protected from the sun and strong currents of air for a period of at least seven days. During this time they shall be sprinkled at such intervals as is necessary to prevent drying, and maintained at a temperature of not less than 50 degrees Fahr. After seven days the tile may be removed to the yard, but in no case, used before they are 28 days old. Under the heading, *Steam Curing*, the tile shall be removed from the molds as soon as possible and shall be placed in an atmosphere of steam saturated with moisture for a period of 48 hours. The tile shall then be removed and stored for at least eight days. The steam curing chamber shall contain atmosphere saturated with moisture and be maintained at a temperature between 100 degrees and 130 degrees Fahr.

The recommended practice adopted by the Interstate Cement Tile Manufacturers' Association provides that the tile, 60 minutes after the removal of jackets, shall be subjected to an atmosphere saturated with

moisture, the temperature of which is not lower than 70 degrees Fahr., and not higher than 120 degrees Fahr. In warm weather the tile shall be subjected to steam curing for at least 48 hours and then removed from the curing chamber and piled in the yard for 14 days; while in freezing weather the tile shall remain in the curing chamber for 72 hours before piled in the yard. The Association requires in the case of natural curing that the tile shall be stored in a room where they shall be protected from drafts, and after hardening sufficiently, shall be sprinkled at least three times a day for a period of six days, and then shall be piled in the yard for 24 days. In freezing weather the tile must be placed in a room where they are not allowed to dry out, and where a temperature is maintained between 55 degrees and 70 degrees Fahr., and shall be sprinkled three times a day for eight days.

In a paper by C. M. Powell,* read at the convention of the National Association of Cement Users, December, 1910, and published in CONCRETE, January, 1911, Mr. Powell devotes considerable attention to steam curing. Mr. Powell points out that steam curing is not to add new moisture to concrete tile, but to prevent that moisture which is already contained in the concrete from being taken up by the atmosphere. He says that the object, therefore, in steam curing is to create an atmosphere saturated with moisture in a chamber sufficiently air tight to eliminate all possible drafts. As a saturated atmosphere is required, the use of dry steam or steam under pressure is out of the question. Dry steam or steam under pressure may give the right conditions in one part of a steam curing chamber, while in another part of the same chamber the tile will not cure properly. Mr. Powell says that the safest and most satisfactory way of admitting steam into the curing chamber is through a perforated pipe which is placed perforations down, in a water-filled trench in the concrete floor of the curing room. As the steam passes through the water out into the room it naturally becomes saturated with moisture. The floor of the curing chamber should be sloped toward the trench so that the condensation constantly replenishes the supply of water in the trough. When steam is used in this way the temperature may be as high as 120 degrees Fahr. or even higher, because as the steam is admitted to the room through water, there is no danger that the tile will be dried out by the heat. The nearer the temperature reaches the maximum possible with this method, the more efficient does the curing chamber become.

Exhaust steam in cold weather will not supply enough heat. It is not advisable to start the steam in the curing chamber as soon as the tile are placed there, particularly in cold weather; as the condensation on them immediately after being made, might injure the tile. If they are left in a warm room for an hour and the steam then turned on, there will be no such danger.

Successful curing chambers are built with walls of concrete block and of reinforced concrete, and with

*Assistant inspecting engineer Universal Portland Cement Co.

arch ceilings, the height of the arch being one-half the width of the chamber, so that dripping, due to condensation, will be obviated, and with the arch ceiling the moisture will run down the arch and the side-walls. It is common to make these arch ceilings of reinforced concrete, using metal lath fastened to rods bent to the arch form, or else one of the rib metals on the market, in which case the metal may be bent at the factory and removed to place of construction, ready to be set up. Best results will be obtained by having a double ceiling with a 2" or 3" air space. Various kinds of doors are in use on the curing chambers, but many of those now giving satisfaction are of canvas, treated with some waterproof preparation and put up on rollers with fasteners at the sides, so that they may be held down tightly to close the opening.

In a paper read by F. S. Phipps, St. Joseph, Mo., at the convention of the National Association of Cement Users, December, 1910, abstracted in CONCRETE, February, 1911, the author refers to an extension of the steam curing system, beyond the kilns ordinarily used in curing block and tile. It frequently happens that a concrete products manufacturer has to turn out a large piece of dimension stone or some such product which cannot be conveniently handled in the curing chambers, and which if given natural curing will clutter up the plant for many days. Mr. Phipps suggests a curing hood. The hood to which the author refers is made of sheet iron, something like a funnel in design, but it may be square or oblong, as the needs of the manufacturer require. At the top of the hood is a ventilator 3" or 4" in diameter. One side of the hood is made of canvas. With the aid of a hood the manufacturer may get large pieces of work through his factory in three or four days. The hood may be moved around to various parts of the shop and steam supplied through hose from the steam pipes extending through the building. On the subject of curing chambers, Mr. Phipps says:

"In handling the steam for the curing rooms there are three or four methods. One is using exhaust steam from the engine which in a great many cases has been satisfactory; another is using the steam from the boiler carrying from 50 to 60 pounds pressure and using a reducing valve to get the pressure down to two and one-half pounds. Low pressure steam or wet steam is to be recommended—direct from the boiler, carrying the water gauge almost full of water and there is less heat in the curing rooms than is found under the other process. You are able to give your curing rooms a large amount or a small amount and you are able to regulate it just as the work demands.

"Another way of handling steam is to install tanks along the sides of the curing rooms, filling them with water and turning into them steam enough to boil the water. Or steam pipes may be run through the tanks, causing the water to boil and creating steam in the curing rooms. Sprayers or sprinklers in curing rooms have been used to some advantage especially upon poured work or wet work as we call it. This work put into the curing rooms for from twelve to twenty hours after being made is hard enough to sprinkle well. The steam is then turned on which hastens the

curing of the product and bleaches it out very much whiter than is possible under any other curing method."

One of the well equipped products plants which CONCRETE has described is that of the Detroit Fireproofing Tile Co., Detroit, Mich., the description having appeared in the August, 1910, issue. In this plant large and small stone alike are steam cured. The Fisher hydraulic machine which turns out the products, makes dimension stone up to 66½" long, 20" wide and 14" thick, and not only these but larger pieces which are hand tamped in wood molds are also put in the same kiln to be cured, being left on their pallets in the kiln with steam at 5 pounds pressure for from twenty-four to thirty-six hours. The steam curing plant was described in the issue of CONCRETE mentioned, as follows: "The steam curing plant comprises four kilns 17' x 22' and four kilns 22' x 22', with a total capacity for 2440 wall feet of block. The kilns, built of concrete block, are arranged on each side of the track over which the mold cars run from the hydraulic ram press. The cars stop in front of kilns and are unloaded by four men, two serving one kiln and two serving the opposite kiln. After steaming 24 hours, the kiln is unloaded by means of a Mathews' gravity carrier. The cost of unloading a kiln and placing the product in the storage yard, averages about ½ cent per wall foot. Cars for rail shipment can be loaded from the storage yard for about the same cost. The steam curing is done with an unright 25 h. p. boiler, at 5 pounds pressure."

In an article describing the concrete products factory of the Cunard-Lang Construction Co., Columbus, O., in the issue of CONCRETE, December, 1910, the steam curing plant is described as follows: "There are six steam kilns, each 9' wide and 65' long, containing two tracks. In addition, there is what the company terms a 'steam room' which is virtually a kiln 24' wide and 65' long. In this there are three tracks. Most of the roofing tile, dimension stone and ornamental products are cured here.

"Each track will hold nine cars, and if all kilns were full at one time they would contain 135 cars. The cars are of the Chase make, the 3-deck type. A car will hold 24 10" block, or 27 8" block. The Chase tracks in the factory, steam kilns and the immense storage yard and one three-way dump car of ¾ yard capacity complete the track and car equipment.

"The steam is led from the power plant into the kilns in 1¼" pipes. Contrary to the usual custom, the steam, under a maximum pressure of 10 pounds, is not allowed to escape through perforations in the pipe. The feed pipe is hung on the wall of each kiln, a foot below the ceiling. About 20' from each end a vertical pipe suspends from the main pipe and extends to the floor. It is open at the bottom and the steam escapes into a well a foot square and perhaps 18" deep, sunk into the floor of the kiln. Mr. Uhle maintains that the steam is thus made to envelop the concrete units more perfectly than it could otherwise be made to do. A thermostat and a reducing valve are connected with the steam line and regulate the pressure for the kilns."

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Advantages of Concrete Arch Bridges

(Continued from page 58)

to an arch, therefore, that it is not adapted to low, flat locations is not usually founded on good judgment. In the arch foundations, the load is supported at the back of a wide abutment, while in the concrete bedstead bridge, the load is transmitted to the foundations at the stream face of a narrow abutment. This difference gives the arch greater immunity from undermining. In nearly all flood failures, it has been the narrow pier and not the wide abutment that was undermined.

TEMPERATURE CHANGES

Concrete expands and contracts with changes of temperature at approximately the same rate as steel. In this climate the range in such structures may be 80 or 100 degrees Fahr. For a span of 100 feet, a rise of temperature of 100 degrees will increase the span approximately three-fourths of an inch. The bedstead bridge has no provision whatever for sliding on the abutments, the girders being securely joined to the legs themselves. Hence in winter the tops of the legs are drawn towards each other, and in summer are forced apart. This movement recurs with every change of temperature, and there must, therefore, be a continual following up and pushing back of the earth fill. If the pounding of traffic does not accomplish this, the action of frost most assuredly will. This must result in stresses tending to curve the legs inward and to arch the girder upwards. Steel bridges of this type are frequently found with a lower chord in compression throughout, the upper chord carrying the loads by arch action alone. Of course, the stresses in such a structure are utterly indeterminate.

The concrete arch provides automatically for changes in temperature. The abutments remaining fixed the changes in length of the arch ring produce a slight rising or falling of the crown of the arch. It is necessary only to provide expansion joints in the spandrel walls to avoid the cracks that otherwise might occur from this arch movement. The distortion of the arch ring does, of course, modify the stresses and some designers have found such stresses excessive for the lowest temperature combined with the heaviest loading. No failure has ever occurred under these conditions, and the high stresses found have undoubtedly been due to a strict application of text book methods of analysis without good judgment. For example, the excessive stresses can usually be reduced by decreasing the thickness of the arch ring at the critical point. In other words, thinning the arch will strengthen it.

Assuming the abutments to be elastic, as well as the arch ring, in the application of the elastic theory will eliminate these excessive stresses altogether. Arches carrying heavy brick buildings have behaved satisfactorily for years, proving that the arch movements due to temperature changes are not more serious than the usual settlements in foundations of

such buildings. The stress in the arch ring at the point where it joins the abutment cannot be nearly as serious as the stresses on the bridge seat of the bedstead girder due to eccentric application of load with change of span caused by variations in temperature.

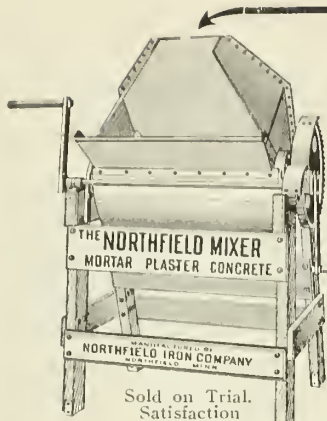
The pavement on a bridge should be of the same character as the paved approaches. The practice of using a light, reinforced concrete floor without a covering of earth or other paving material cannot be too severely condemned, whether for steel or concrete bridges. Such a floor is hardly more permanent than a wooden floor yet is frequently used on the assumption that it makes a permanent bridge and because of its lightness which permits reduced sections in the bridge. Any flat top bridge is objectionable under a roadway of earth or gravel because a chuck hole forms at each approach, due to the change from a harder to a softer foundation. No such depressions occur over arches.

The concrete arch thus has the advantage of the concrete bedstead bridge in almost every respect. It is better adapted to soft foundations, is more efficient and more economical, provides greater discharge for the same waterway area, is not injuriously affected by temperature changes, provides a smooth roadway, is easier to erect, and fails slowly in case of failure, can be widened at any time without loss of the original investment and, last and most important of all, is adapted to artistic treatment of railings and spandrels in great variety.

The arch is the ideal bridge for the expert designer. It is intricate in analysis and not readily solved by the novice. Many improvements have been made in late years to reduce its cost and many more are possible. Details of false work centers have been improved in the last ten years to save fifty per cent of their cost. Piers have been lightened to one-twentieth the span where a rigid application of the elastic theory according to text book methods would require three times that thickness. The concrete arch has thus become the cheapest of permanent bridges for spans in excess of twenty feet and is the ideal highway bridge.

The possibilities of the concrete tile manufacturing business is shown by a statement of what thirty-one counties in the state of Iowa have done with concrete drain tile. Up to and including the year 1910, these thirty-one counties spent \$15,200,000 in concrete drainage work. This outlay was for public work only. Private outlay in drainage work in the same counties cost over \$60,000,000 in the same time. It has been estimated in the Glenwood, Ia., *Opinion* that it will take \$450,000,000 more to complete the drainage work in the state of Iowa alone. It is now estimated that a total of 30,000 miles of drain are being put in each year at a cost of \$20,000,000.

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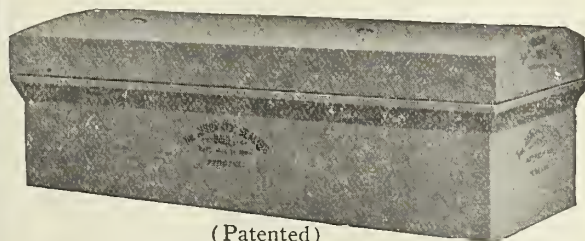
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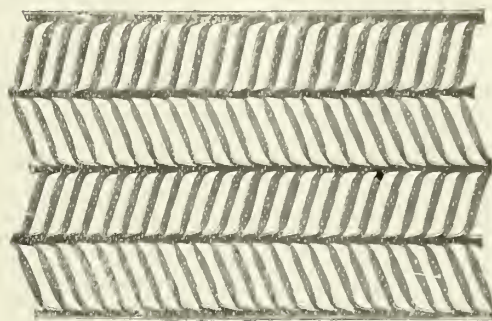
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Some Early Concrete Sewer Pipe Work

BY G. O. SANDERS.

In the February, 1912, issue of CONCRETE an inquiry appears in the Information Department as to concrete pipe. In 1874 and 1875 the writer was employed by S. D. Chandler, Nashua, N. H., making sewer pipe, and it has been in use ever since in that place, and was used several years before I was there. Nashua was at that time a place of about 18,000 inhabitants, and we used the English Portland cement at a cost of \$6.00 per barrel, as this was about the time the first Portland cement was manufactured in this country. We made pipe in sizes from 4" to 20" inclusive, in diameter, and used a mixture of 1:3 cement and sand, the sand being of the grade used by plasterers and masons in making mortar. It was good, clean, sharp sand and we made the mix wet so that by squeezing in the hand it would stick together. In filling the molds, we put in only a small quantity at a time and tamped thoroughly with an iron tamper. There were three of us doing the work. The pipe we made were all bevel end pipe, and the walls of the pipe ranged from $\frac{3}{4}$ " for the 4" size to $2\frac{1}{2}$ " for the 24" size. We had molds enough of the various sizes for a day's work and the molds were not taken off until we were ready for the next day's work. The pipe were then sprinkled three times a day for the next three days and at the end of that time were taken out from under the shed into the open air and were sprinkled three times a day for the next two weeks. Every city sewer pipe laid since then has been of concrete made by Mr. Chandler, except the pipe over 24" in diameter, which are built of brick. No waterproofing was used in manufacturing the pipe and there was no washing over with neat cement. By using a 1:3 mix of medium fine sharp sand, and tamping, which was insisted upon, we made a dense concrete which did not need any waterproofing. The mixture which we used was turned four times dry before putting in the water. It was customary to make the pipe one summer and carry them over one year before using them. There was no steam curing in those days.

After the Civil war, iron was very expensive, and laying water pipes, for many cities, was a problem. The city of Fitchburg, Mass., laid about ten miles of 4" and 6" water pipe, which was made by filling in around an outer shell of sheet iron riveted together in 8' lengths, with 1" of concrete for the 4" size, and $1\frac{1}{4}$ " of concrete for the 6" size. This was put on by means of a collapsible core. This pipe carried an average water pressure of 40 lbs. and was in use for twenty years or more, until iron became cheaper and it was gradually replaced with cast iron, as the system was extended.

In 1875 I put in a concrete cistern at Hudson, N. H., using wooden molds which I made myself. The walls were 4" thick. The cistern was made of Rosendale cement, 1:3 mixture, very wet, and when completed was left three weeks before the molds were taken out, and when the molds were removed the inside walls were given a wash of neat cement and water, two coats. The cistern is standing today and is in as good condition as ever, probably better.

The United States Government's Tests of Waterproofings

Technologic paper No. 3 of the Bureau of Standards, Washington, D. C., has been published by the government. It covers tests of the absorptive and permeable properties of Portland cement mortars and concretes, together with tests of damp-proofing and waterproofing compounds and materials. The text is by Rudolph J. Wig, Associate Engineer-Physicist, and P. H. Bates, Chemist, of the Bureau of Standards. Early work in the tests was done by the Technologic branch of the United States Geological Survey, at the laboratories at St. Louis, Mo., under the direction of Richard L. Humphrey. R. F. Havlik assisted in conducting the tests.

In order to get reasonable results, typical materials were used throughout and test pieces were cast in such form that they could be inserted in an apparatus designed with water-tight connections, in such form that a flow of water, equivalent to a hydrostatic head of 46.2 feet, was forced through the specimen under test.

Mortars ranging from 1:2 to 1:8, with sand of differing constituents, and concretes ranging from 1:2:4 to 1:4:8, with intermediate mixtures, were tested. Results were fairly uniform, and the general findings showed:

That mortars 26 weeks old are less permeable than those 8 weeks old, which in turn are less permeable than those 4 weeks old.

The richer the mixture, the less permeable the mortar.

Mortar of quaking consistency was less permeable than that of damp consistency.

The quantity of water passing decreases with the continuation of the flow.

Permeability was approximately the same for similar mortars, whether 1", 2" or 3" in thickness of test piece.

Coarse sand mortar was more permeable than finer grain sand mortar.

Test pieces mixed 1: $\frac{1}{2}$:5, using standard No. 4 sand and No. 6 stone, or No. 5 sand and No. 6 stone, were the most nearly impermeable.

Permeability tests showed that the permeability of concrete is not dependent entirely upon the quantity of cement used in proportion to the total aggregate, but depends also upon the ratio of coarse aggregate. For example, the concrete in which No. 4 sand was used, was less permeable in the 1: $\frac{1}{2}$: $7\frac{1}{2}$ mix than in the 1:2:4 mix, though the former contains considerably less cement in proportion to the total mass.

Under the general head of tests of waterproofing materials and methods, two classes were considered. First, those for waterproofing with the object of preventing the flow of water through masonry subjected to a hydrostatic head; second, those used for overcoming dampness resulting from the capillary

(Continued on page 68)

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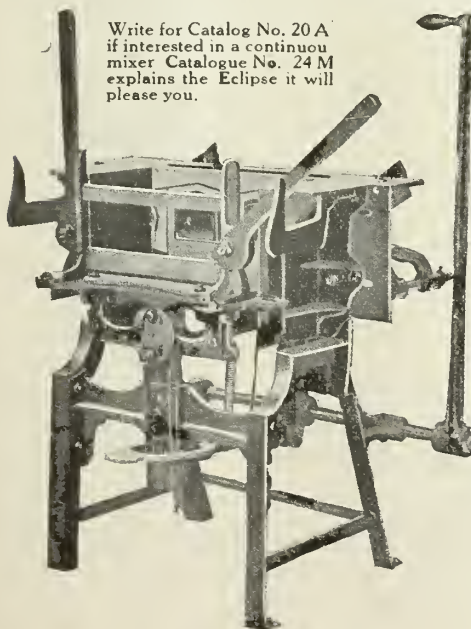
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Manufactured from best quality Worcester Grade Terne Plate, furnished painted or galvanized (galvanized after formation) size 10x14 inches.

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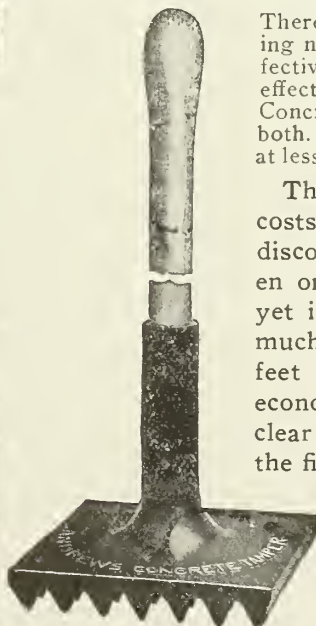
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(Continued from page 66)

attraction and the absorptive qualities of masonry.

The compounds were thus divided into coatings and integral compounds. Under the head of coatings were considered the linseed oil paints and varnishes, the bitumens, the liquid hydrocarbons, the soaps, the cements, and miscellaneous compounds. Under the head of integral compounds were considered solids and active liquids. Solids were divided into inert fillers, active fillers and antipathetic or water-repelling substances.

In all, inquiry was made into the damp-proofing and water-repelling properties of forty materials. The products tested were bought in the open market and covered practically every type of compound used for waterproofing and damp-proofing, with the exception of plastic coatings reinforced with fabric.

Results of the inquiry are not especially encouraging, so far as the waterproofing properties of a number of compounds on the market are concerned. The investigators determined after completing the tests that Portland cement mortar and concrete can be made practically watertight or impermeable under any hydrostatic head up to 40 feet without the use of integral waterproofing materials. But in order to secure concrete of this character, considerable care must be used in selecting and incorporating materials, proportioning, mixing and curing. This is nothing new to the majority of concrete men who have given the subject careful study. The report also says, with perfect truth: "The addition of so-called 'integral' waterproofing compounds will not compensate for lean mixtures, nor for poor materials, nor for poor workmanship in the fabrication of concrete."

No manufacturer of waterproofing compounds is foolish enough to claim that his product or method will take the place of material wilfully or ignorantly omitted, or mixing and curing deliberately or carelessly slighted.

The report says, further: "Where Portland cement mortar is used as a plaster coat, if sufficient cement is used and the sand contains sufficient fine material (or a fine material be added) and the mortar be placed without joints and well troweled (care being taken not to over-trowel, which may cause crazing), the coating will be effective as an impermeable medium without the use of any waterproofing compound."

Yes, but there are still a good many "if's" in that paragraph. Ideal concrete is waterproof; damp-proof—proof against all ills. But ideal concrete is rarely made, even in the laboratory, very, very rarely in the field. With all honesty of purpose and effort, the combination of good materials, honest labor and expert supervision may turn out concrete that would certainly be no worse for waterproofing means. Any concrete man knows that he has made one batch of concrete that leaked like a sieve and another batch, just like the first in every observable particular, that was watertight when waterproofing

was added in the process. What makes the difference?

Waterproofing is inexpensive, easily applied, a measure of safety in many cases. Failure to use it is unjustified by its cost or inconvenience. We believe in it and still are certain that in the majority of cases its use is justified by economy and good practice.

White Portland Cement for Interior Plaster

Experiments which show the value of white Portland cement as a hard finish for interior plaster have been made under the personal supervision of E. J. Alferrice, foreman for the Interborough Rapid Transit Co., New York City. Using Medusa white Portland cement Mr. Alferrice made a plaster slab, the mixture consisting of 1 part cement and 2 parts clean sand (if clear white is desired marble dust should be used). This plaster was applied $\frac{3}{4}$ " thick as a base, and the surface was left rough enough to insure good bond for finish coat, which was made of 1 part cement and 1 part fine marble dust and 10 per cent (of the entire mix) of hydrated lime. This was applied in a thin coat and finished with a steel trowel. This left a smooth hard surface equal to the best interior plaster, at an approximate cost for the material for the finish coat, of 12 cents per sq. yd. for ever eighth of an inch in thickness. Mr. Alferrice has been able to produce very beautiful marble effects using white Portland cement. The color effect is produced by dipping silk threads into the color desired and passing them over the face of the slab after the final troweling. It is said that to insure clear lines no attempt should be made to use the trowel after the color has been applied. Samples of plaster slab have been laid up on the walls, roof and store room of the Interborough Rapid Transit Co., New York City. Mr. Alferrice used white cement all the way through this slab. This seems hardly necessary. The same result may be obtained by using gray cement with 2 parts of clean sand for scratch coat and a second coat $\frac{1}{4}$ " thick of 1 part white cement and 2 parts marble dust, the finish coat applied as on the slab described.

These experiments seem to open up a new field of use for white Portland cement as an interior finish material for the walls of churches, hospitals, school buildings, hotels and so on, as well as for kitchens, laundries, bathrooms, swimming-pools and other places where a waterproof white wall is desired.

A new sixteen-page illustrated publication is being issued by the Universal Portland Cement Co., *Permanent Pavement*. It covers the field of good roads, and while the company is now especially interested in pavements using concrete it will cover all types. It is to arouse interest in road improvement and in bettering farming conditions through better transportation facilities.

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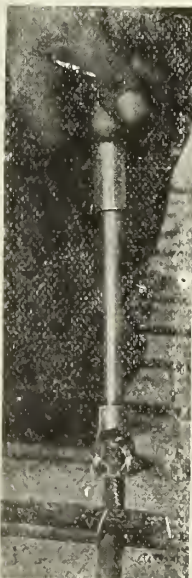


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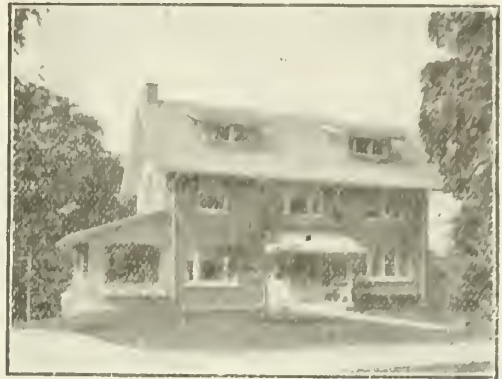
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Our nearest representative will supply you—numerous shapes and sizes, in three colors, Newport Gray (silver gray), Slate (blue black) and Indian Red.

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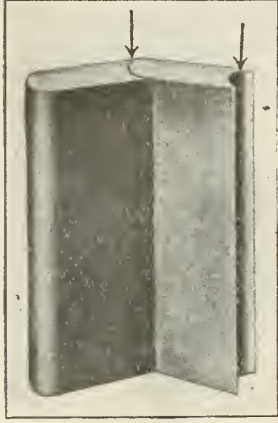
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Concrete Staves Used In Building Tanks, Silos and Culverts

The idea of concrete lumber is one that is gaining ground in various kinds of construction. It offers a great advantage sometimes to be able to use machine-made or mold-made units in building up a structure of this permanent material. An article elsewhere in this issue describes the use of concrete lumber in making greenhouse benches. Another development along this line is



Concrete Staves

brought about through the perfection of a machine on which concrete staves are made. These staves are used in the construction of silos, culverts, tanks and so on, and they are so fashioned that the diameter of the structure does not in any way affect the usefulness of the stave units. This fact should be made quite clear in the accompanying illustration, which shows two of the staves joined as for a piece of construction work. The Rammer-Playford stave machine is made by the Cement Stave Silo Co.* The staves are 30" long, 10" wide and 2½" thick. One of the long edges is concave and the other is convex so that these edges are complementary in making a tight joint.

*Des Moines, Ia.



Silo Built of Staves

The concrete, ordinarily, is a mixture of cement and gravel in the proportion of 1:3, and with this mixture a special liquid preparation is employed, the same preparation being used as a wash for the inside of the completed structure. In building a silo the first circle of these staves is made with every alternate stave of one-half length, or 15", so that when the other courses are put on, joints are broken all the way around. In building a silo or similar structure, ⅝" steel hoops which have a special joint, are put on every tier of staves. Although the machine is comparatively new in the market, the staves have been used for some time, so that their worth has been tested.

Clay Interests Buy Concrete Tile Plant

Clay interests have bought the patent right of the Thomas glazed cement sewer pipe machine in the state of Washington. They have also bought the unoccupied territory in Oregon. They have purchased the operating plant at Tacoma, Wash., and have dismantled it. It is reported that the same interests are making an effort to buy the Portland Glazed Cement Pipe Co., Portland, Ore.

The reason for this desperate activity on the part of the clay interests may be found in a letter written by Will A. Curliss, 801 Lowman building, Seattle, Wash., associated with the Thomas company. We quote:

"We received patents to the Thomas machine less than three years ago and have built and put in operation 28 machines. We make a pipe with bell and spigot end that will stand any test against vitrified clay. In our fight with the clay people we have had 17 city governments change their ordinances, allowing glazed cement pipe in all city work in competition with clay. In 1911 we put in the ground over 2,000,000 feet of glazed cement pipe for sewer purposes, sizes ranging from 3" to 30" in diameter. Our plants used over 700 cars of cement and this year we have doubled the capacity of three plants; put in four new machines and will use over 1,000 cars of cement."

The purchase of the territorial rights of one such machine is not likely to discourage the manufacture of this kind of sewer pipe as there are several of these machines on the market and they undoubtedly will be installed.

Every man who has a steam curing system for taking care of his concrete products, of whatever kind, should read CONCRETE's announcement, page 105, this issue.

CONCRETE will be glad to pay 25 cents each for a few copies of the issue of CONCRETE of August, 1908. If you have a copy to spare write us before you send it to make sure that we are still in need of more of them.

F. M. Bowman, secretary, Wayne Rawley, manager of structural works, and A. Bovard, engineer, of the Riter-Conley Mfg. Co., Pittsburg, have resigned these positions and are organizing a large manufacturing concern in conjunction with the Blaw Steel Centering Co., Pittsburg, Pa.

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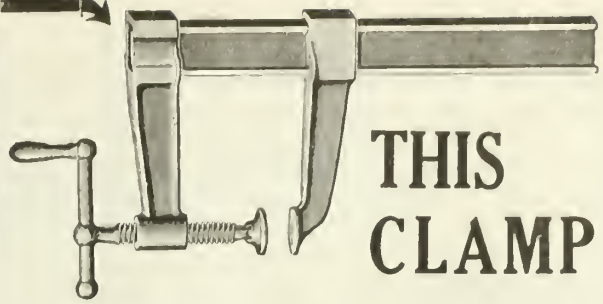
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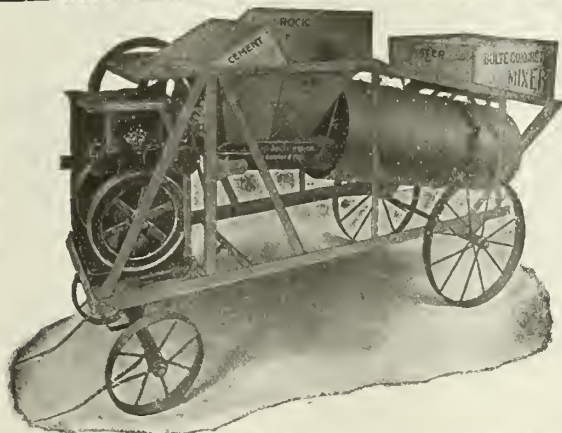
is the handiest, cheapest, most satisfactory device for holding concrete centering in place. It is instantly adjusted, holds the forms rigidly and is easily released. A turn of the screw arm does it. These clamps are just as handy in manipulating wood molds in your shop as they are on the construction job. They are far better than nails or wires.

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If in the market for Block or Brick machines, Power Tamper, Gasoline Engine, Sidewalk, Culvert or Bridge Forms, Finishing Tools, Wheelbarrows, Steel Facing or Mortar Box—

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THE BOLTE MFG. CO.

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**INTEGRAL
WATERPROOFING
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FOR
**CEMENT-MORTAR AND
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THE STANDARD PAINT CO.
100 WILLIAM STREET NEW YORK

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NOT A SOAP
NOT A MINERAL FILLER
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A WATER SOLUBLE ASPHALTIC PASTE
WHICH COMBINES
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PRICE FOR PRICE
THE CHEAPEST
POUND FOR POUND
THE BEST

OUR BOOKLET
"INTEGRAL WATERPROOFING"
SENT ON REQUEST

American Road Congress for Detroit, Mich.

Charles P. Light, Washington, D. C., who is the field secretary of the American Association for Highway Improvement, spent several days in Detroit the first part of May. Detroit is in the field for securing the first American Road Congress, which will be held the week of September 30 to October 5 next. This Congress ought to be one of the most important educational and economic meetings in the history of American development, for it is not too much to say that good roads affect favorably every department of human activity.

Detroit, in the heart of Wayne county, is an ideal place in which to hold a convention of the men interested in good roads and all they mean to the people as a whole. The county roads in Wayne are among the best in the country. Within the last three years, in the neighborhood of 30 miles of concrete roadways have been laid, and this season there will be constructed, according to present plans, 40 miles in addition. This work will occupy a force of close to 1,200 men.

Visitors to the Congress will obviously have an opportunity to see concrete roads in all stages of construction and wear. The county road work has been going steadily forward, and the recent appropriation of \$2,000,000 in the form of a bond issue, insures its continuance for several years to come. County Road Commissioner Edward N. Hines is an enthusiast on the subject of good roads, and his practical experience has convinced him that concrete offers a better road, at a lower initial cost and a lower cost of maintenance than any other type of pavement now available.

Mr. Light, in the course of his visit to Detroit, was given an opportunity to see a good deal of the city from the standpoint of its facilities for entertaining conventions—and he was frankly enthusiastic on the subject of concrete in roadways.

After his inspection of the roads he said: "I have been trying to figure out, ever since I have seen them, how much better your Wayne county roads are than I expected to find them, but I have given up the task. They are certainly much superior to any other concrete roads that I have been over, and they are clean and make an automobilist's paradise. They are certainly remarkable exhibitions of modern road construction and their cost of maintenance, stated to be less than \$2 per mile per year here, is a source of wonderment to me."

Mr. Light is by no means the first convert to concrete roads after an inspection of those in Wayne county, and any man who is interested in roadways of a high order, laid and maintained at a low cost, will find it well worth his while to use his influence to bring the first American Road Congress to Detroit. The hospitality of the city and her people is well known. Experience in handling conventions

makes for smoothness of detail. While the Congress will undoubtedly fix its mind upon the matter of good roads and how to make them best and cheapest, it is pleasant to know that the opportunity to add to knowledge of the subject may be had under such pleasant surroundings as Detroit offers.

H. H. Meyer Co., 110 S. Howard St., Baltimore, Md., and the Dominion Equipment Supply Co., Winnipeg, Canada, have taken the agency for the "Chain Belt" mixer and other concrete equipment in their respective territories. The latter company has opened a new plant at Vancouver.

An over-coat of cement plaster frequently makes an old frame building not only more attractive in appearance but adds as well to its value in resisting fire and in keeping out the cold. The illustration shown here is of the Kimball house at Kimball, S. D. Originally it was covered with 5" drop siding which had warped to a considerable extent, giving the weather a free passage to the interior. This siding was pulled off the building and wood furring was put on over the sheeting. To this, Berger metal lath was applied and the stucco was then applied on the metal lath. Such a covering is of particular value in the prairie country in withstanding high winds and severe weather. It is an inexpensive



method of making almost a new building out of an old one. The cost of doing such work varies considerably with the location. It has been done as low as 69c a yard in small towns where labor is cheap and where the working day is long, and it sometimes is as high as \$1.15 a yard in larger places where the workingmen are better paid. The price in Minneapolis, for instance, is \$1.00 per yard; 85c per yard is considered a good average price.

Sanford Concrete Machinery Co., Toledo, O., has moved its headquarters from the old place on Jefferson avenue to 501-3-5 The Nasby Bldg.

Our book "Raydiant" tells just how to figure stresses, how to specify sidewalk lights and how to install them. Send for a copy.

BERGER'S *Raydiant* SIDEWALK LIGHTS

bring daylight through a sidewalk and refract it to the end of the deepest basement. They cut down lighting bills and increase rental income by making underground space available for use.

No other system of sidewalk lights has the reputation with the architects and owners that

BERGER'S *Raydiant*

has. First in the field, it has been improved right up to perfection and has stood so many long and severe trials that people desiring more daylight should not fail to address Berger. Our new glass prevents cracking and shaling.

No Chance For Error in Installation

Any sidewalk contractor can put in this system. Permanent metal forms and the right kind of glasses are shipped ready for assembling and concreting.

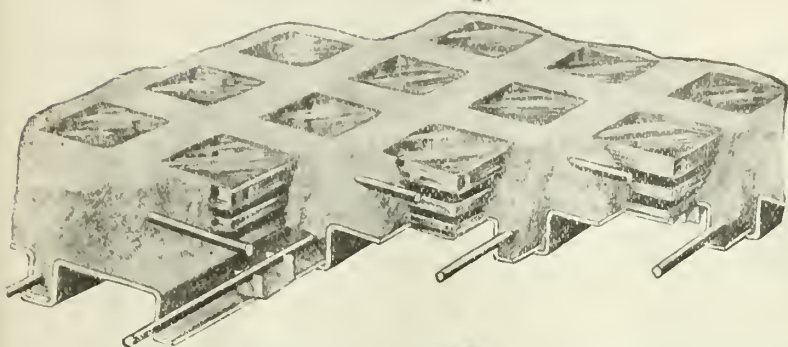
THE BERGER MFG CO.
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Also manufacturers of Metal Lumber, Prong Lock Studs and Furring, Rib-Trus, Ferro-Lithic and Multiplex Reinforcing Plates, Metal Ceilings, Expanded Metal Lath, Sidewalk Forms, etc.



Section of Raydiant Sidewalk Lights showing permanent metal forms, glasses for admitting light, reinforcement running both ways and metal chairs for supporting reinforcing rods.

There are many valuable and important features incorporated in our 1912 Model

"CLOVER LEAF" Mixers

And it will repay prospective buyers to inquire into their merits.

We are giving more Mixer value for the money than can be procured elsewhere. This is a broad statement, and we would hesitate to make it if we did not have the proof.

The Design and Construction is a combination of extreme Sturdiness and Portability. This means unusual strength without excessive weight.

The Involute Curve Mixing Principle (employed exclusively in "Clover Leaf" Mixers) assures rapidity and complete effectiveness in mixing, and with all inside mechanism eliminated, no Mixer is so easy to keep clean.

You cannot afford not to investigate these machines. Write us for Catalog today.

The "CLOVER LEAF" COMPANY, South Bend, Ind.



ONE Merrilat Core Form Makes ALL Sizes of Culverts

Scores of highway officials and road builders throughout the country use the Merrilat Culvert Core Form for building culverts. With one form they can build culverts ranging from 20 inches to 4 feet in diameter. The core form is collapsible and expandable. It is easily moved on its own rollers. Rollers fold up out of the way when concreting is in progress.



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Oak and Railroad Sts. - - - Winfield, Iowa.

There is money to be made building culverts, providing you don't have to buy a dozen different forms for different sizes. Get a Merrilat core form and make money.

Free Book on Culverts.

If you build concrete culverts, cut this coupon out, pin it to your card or letterhead and mail it to us. We'll send you a booklet full of cost data on concrete culverts.

New Equipment, Methods and Materials

In this department the Editors endeavor to keep our subscribers informed upon new tools, methods, machines and materials used in this industry. It is in no sense a department for the benefit of advertisers. To secure attention the thing described must be new to our readers. No matter will be printed simply because an advertiser desires it. Likewise, no matter will be excluded simply because the article described is not advertised in this paper. We aim to keep our readers informed—suggestions for the improvement of this department are solicited.

Zeiser Bros., the pioneer builders of metal sidewalk forms, Berwick, Pa., have improved their forms by eliminating clamps, keys, bolts and wedges and substituting an automatic device which locks the expansion joint plates securely to the metal side rails.

The side rail has a slot to receive the end of the dividing plate, to which is riveted a revolving button, as shown in Fig. 1. As the dividing plate is



Fig. 1

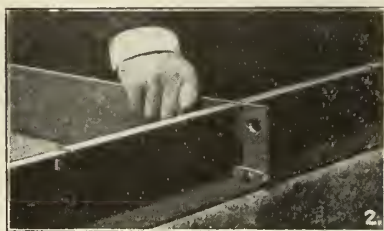


Fig. 2



Fig. 3

lowered into the slot, one end of the oblong button strikes the rail and revolves far enough to clear (Fig. 2). As the plate lowers farther, the end of the button strikes the lower flange of the side rail and trips automatically, throwing the opposite end of the button against the web of the side rail, locking the plate and rail together and preventing the bottom part of the rail from springing out. The upper portion of the rail is held by the tapering slot in the dividing plate.

In removing the dividing plate, the workman simply lifts it and the movement of the button releases the forms promptly (Fig. 3). Sidewalk contractors who are using this method of locking plates and rails assert that it saves a great deal of time.

The Lansing-Company, Lansing, Michigan, has put on the market an all-steel mortar tub for the use of contractors. It is claimed that this tub has many advantages over the old-style wooden box. It is lighter, since it will not absorb water; neater in appearance; cleaner, since mortar will not adhere to it; and cheaper in the long run, since it will outwear three wooden boxes. As several of these tubs may be nested together in moving from job to job, they are more easily and conveniently handled. They are made from heavy sheet steel.

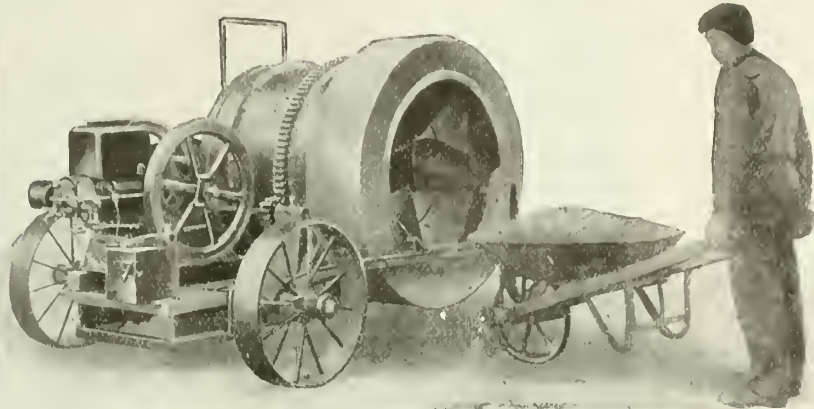
W. F. Jordan, chief engineer in charge of construction on the new Grand Central Terminal of the New York Central Lines in New York City, furnishes some interesting data on the cost of tying reinforcing rods in place. In some of the first concrete work done, the intersections of the steel rods were tied with straight wire ties with a pair of pliers. This cost 32c per 100 ties. Later the men were supplied with "Curry" tyers. Immediately the cost

of tying dropped to 15c per 100 ties and when the men became accustomed to the tool the cost was brought down to 10c per 100, a reduction of 68 per cent.

Chief Engineer Jordan further reports that an additional saving must be credited to the tool as he was able to carry on the work of tying the steel in the coldest weather, when the men would have been unable to use pliers. He states that the workmen are not bothered with sore hands and that the Curry tyer is never stolen, being of no use to the average person, while common wire pliers have a way of disappearing from the job.

On the basis of the above figures and the number of ties actually made on the job in the past 15 months, the New York Central has saved \$3,876.40 by using the new method of tying. The Curry tyer has already been described in these columns. It is used in connection with a special wire tie and is manufactured by Clifford L. Miller & Co., 110 E. 23d St., New York City. The company has a plant in Brooklyn with a capacity of 2,000,000 ties per day and a plant in Germany with a daily capacity of 200,000 ties. This system of tying is not only used in tying intersections of reinforcing rods but also in tying bags filled with cement, lime, plaster, etc., at the mill.

REALLY LOW CHARGING



**NO
Platforms
Inclines
Runways
Skips or
Buckets**

THE TRIUMPH **SELF-LOADING NON-TILTING BATCH MIXER** **Charges on the Ground Level—Saves Expense.**

Don't buy a so-called "Low Charger" which requires an incline, even if it's "thrown in," for you still have the time-consuming, laborious, up-hill shove for the barrow. Note the compact build, the underslung frame, reducing vibration, the direct drive, the automatic water feed, and many other money-saving features of this modern machine. Mixes a batch of perfect concrete in ten seconds. Capacity: No. 7, seven cu. ft.; No. 11, eleven cu. ft. of loose material per batch. Simple, durable construction throughout. Investigate the Triumph if you want to buy right and at low price.

THE LITTLE WONDER

Here's a marvelous little Tilting Batch Mixer for small jobs—driveways, curbs, foundations, etc. Astonishingly simple, strong, rapid, economical, and so low in price that it's in a class by itself. It will mix a batch in less than a minute at a cost for gasoline of only one cent per cubic yard. Capacity 25 to 35 cubic yards per day.

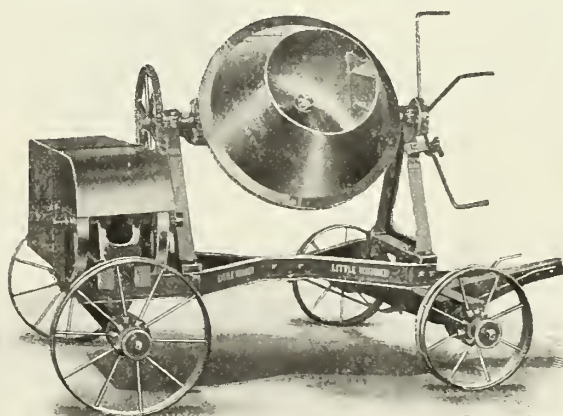
The LITTLE WONDER eliminates paddles, small parts and cumbersome hoppers, also break-downs, tinkering and loss of time. Charges on one side and discharges on the other into barrows or forms, without stopping engine. Saves \$10.00 a day over hand mixing and the hardest part of the work, and will pay for itself in twenty days.

Ten Days Free Trial

Put the LITTLE WONDER on your own work for Ten Days Free Trial. At the end of Ten Days if you are not satisfied with the machine in every particular, return it to us at our expense and we pay the freight both ways.

Write for catalogue and Special Ten Day Offer Order Blank, and we'll show you the biggest little thing you ever saw in Concrete Mixers, for either large or small contractors.

"The Small Job Money Maker"



WATERLOO CEMENT MACHINERY CORPORATION

105 Vinton St., Waterloo, Iowa.

Mfrs. CONCRETE MIXERS, CONCRETE SPREADERS, BUILDERS' HOISTS, ELEVATORS AND CEMENT TOOLS.

Extension Loader for Mixer

Contractors who carry on heavy concrete work, especially in the railway field, have created a demand for an extension loader to be used in charging a concrete mixer mounted on a flat car. Such an attachment has been built by the Chain Belt Co., Milwaukee, Wis. The one shown in the illustration is being used by the George A. Fuller Construction Co., Ltd., on some work being done for the Canadian Pacific Railway.

The loader travels down a 15' track to a point considerably below grade, receives its load of material and runs up to charge the mixing drum. From experiments made it has been demonstrated that a loader working on an extension as long as 30' operates smoothly and effects a large saving in time and labor. The extension is attached to the mixer frame in such a way as to allow its easy removal and the direct attachment of the loader to the mixer for work on ground level.

Face Plate Enamel

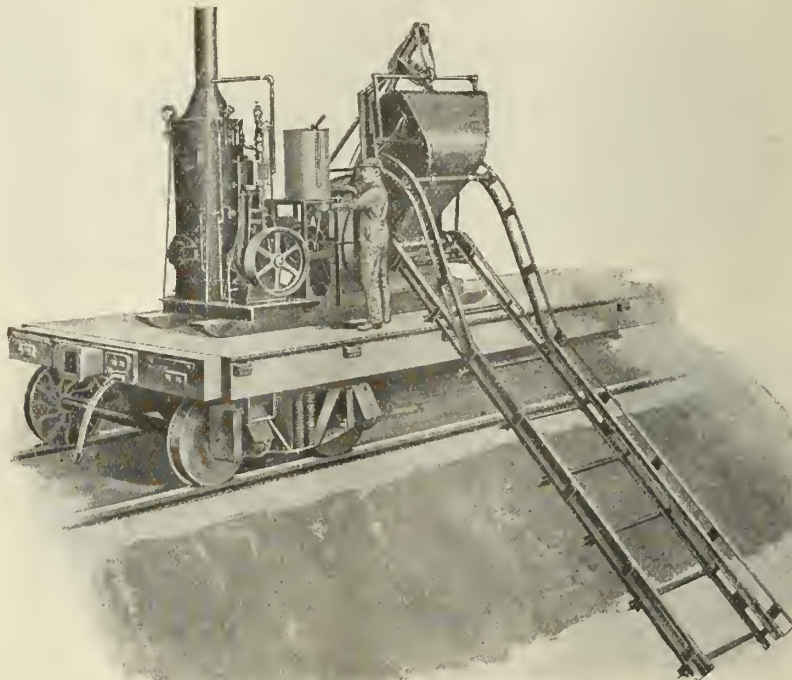
Manufacturers of concrete products who have had trouble in getting cast pieces to draw cleanly from the molds, where the wet process was used, will be interested in an "anti-stick" enamel, being introduced by the Anti-Stick Co., Westerville, O. This enamel is applied to the face plates of block machines and to the casting surface of column, brick, pedestal, balluster and other molds. It conforms strictly to the pattern of the mold, forming an enamel coat which will last for several days even when the molds are being used constantly for casting pieces from wet concrete. It is said to make the molds draw easily, prevents particles of concrete sticking to the molds and gives the finished product a clean, smooth surface.

Julian Herndon and E. F. Hettrick, both formerly connected with the Southern Ferro Concrete Co., have organized the Herndon-Hettrick Engineering Co., with offices in the Empire Bldg., Birmingham, Ala. The company will do a general engineering and contracting business, special attention being paid to reinforced concrete work.

The Edwards Mfg. Co., Cincinnati, O., manufacturers of metal shingles, siding, ceilings, etc., has opened a branch house at Dallas, Tex., where a stock will be maintained. J. F. Agnew is in charge.

Steel Frame Bar Shears

The use of special types of shears for cutting reinforcing bars in the shop and on the job has led to many important improvements in the methods of shear construction. Henry Pels & Co., 88 West St., New York City, manufacture a large line of shears, punches, etc. They have practically eliminated the use of castings in these machines. The frames are



"Chain Belt" Equipment Used on C. P. R.

built of very heavy, rolled steel plates; working parts are forged.

The Pels open throat shears for the special purpose of cutting reinforcing steel have a solid O. H. rolled steel plate frame. The open throat allows the easy introduction of steel bars for cutting and the lightness and rapid action of the tool makes it a popular one for use on the erection job, as it is easily made portable.

We are the sole agents in United States, Canada and Mexico for

Meyers' German Cement and Liquid

For Patching All Kinds of Cement Work

We have a large stock on hand. Prices as follows:

1 Kilo Can	\$1.50
2 Kilo Can	2.75
4 Kilo Can	5.00
Barrel powder, 50 Kilos, per kilo	.80
Demijohn liquid, 68 Kilos, per kilo	.80

All prices f. o. b. New York City.

We also handle Dugan's Invisible Patcher for patching all kinds of Limestone and Bluestone.

MICHAEL COHEN & CO.

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NEW YORK CITY.

Agents for the Southern States, Missouri, Kansas and Oklahoma:
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Universal Monumental Granitoid Device

**Forms and Engraves at the
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Does the work of twelve high class granite cutters and their helpers.

Invented and patented by L. Bowman, sole owner of territory rights, United States, Canada and Mexico.

We have the only concrete tombstone device on the market, giving exclusive rights to territory and device to the purchaser, that net the manufacturer 300 per cent minimum, and enable him to guarantee his product.

He can cut the prices of his competitors (the cut granite shops) one-half.

The longer a Universal concrete monument stands the harder it gets.

For further information address

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CARBORUNDUM

Grains Bricks Wheels

Three products that every concrete man should know about—

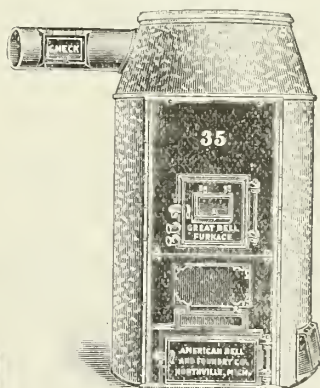
Carborundum Grains—hard, sharp, durable as diamonds—give a non-slip, non-wearing floor, stair, or sidewalk surface—

Carborundum Steel Centered Wheels cut reinforced concrete beams like a saw going through a plank—

Carborundum Rubbing Bricks remove mould marks—clean your forms or mixers—quicker and easier than anything you could use—

Let us tell you more about Carborundum and its uses in concrete work.

THE CARBORUNDUM COMPANY
NIAGARA FALLS, N. Y.



A HOT AIR FURNACE

For Less than
\$50 Complete

For 5 and 8 Room
Dwellings.

An unheard of Price
and a most Remark-
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ible Furnace.

No Pipes No Lost Heat

**AMERICAN BELL AND
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RELIANCE

CRUSHERS and PULVERIZERS

ARE THE PREMIER ACHIEVEMENT
IN THIS CLASS OF MACHINERY.

THE MANY VALUABLE FEATURES EMBODIED IN
THEIR MAKE-UP ARE EXPLAINED IN OUR
CATALOGUE WHICH IS FREE FOR
THE ASKING.

UNIVERSAL ROAD MACHINERY CO.

KINGSTON, N. Y.

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"Little Giant" Brick

The residence shown here is built of concrete brick for John M. Anderson, Wichita, Kans. Brick for the walls, porch columns and porch rails were made on the "Little Giant" brick machine, made by the La Grange Specialty Co., Lagrange, Ind. This machine is operated by hand, making three brick at a time. By the use of a core form, a one-



fifth air space is molded in each brick, resulting in a 20 per cent saving in material and weight. This hollow in the broad side of the brick is endorsed by masons who maintain that the brick "beds" much better in the mortar than a brick with a plain flat side.

The Anderson residence is said to have absolutely dry walls and the desirable architectural effects secured by the use of brick in columns and porch rail is apparent.

Industrial Cars

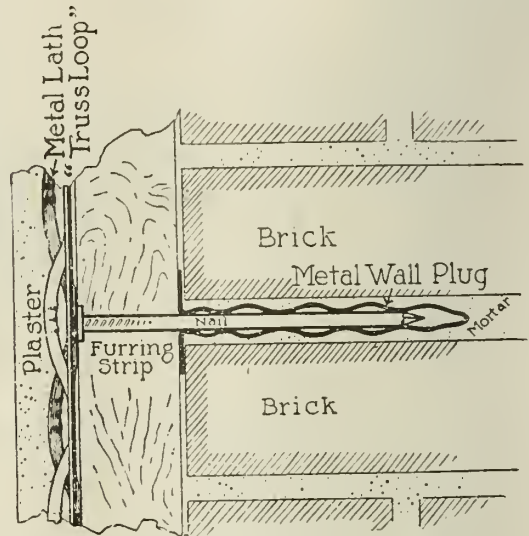
Cars for all classes of industrial work are made by the Youngstown Car Mfg. Co., Youngstown, O. The company's catalog No. 122 has recently been issued and it contains a full description of the types of cars manufactured. Illustrations of each type, with specifications of equipment and capacity, are published.

Concrete contractors and concrete products manufacturers will be interested in this unusually complete catalog of an important allied branch of the cement and concrete industry. A number of refinements of construction and design have been introduced by the Youngstown company, to facilitate operation, increase capacity and minimize danger of accidents.

If you have a copy of the August, 1908, issue of CONCRETE to sell for 25 cents, write the Concrete Publishing Co., Detroit, Mich.

Corrugated Wall Plug

A wall plug with three distinctive features is made by the Bostwick Steel Lath Co., Niles, O. The plug is heavier than the ordinary wall plug, is made of specially prepared 22-gauge iron, and the corrugations in it serve to bind it in the mortar joint and at the same time act as teeth in gripping the nail when it is driven.



The sketch reproduced here shows the plug used as a nailing base for attaching furring strips to a brick wall. In concrete construction, the plugs are laid in the mortar joints between brick or block, or are attached to the inside of the wall form and embedded in the poured concrete wall.

Many contractors who are called upon from time to time to do small concrete jobs find that it is expensive to operate a large capacity mixer and they revert to the old system of hand mixing. This situation sometimes arises on a building job. A big concrete mixer, or a battery of them, is used on the major part of the concrete work, but there is often a certain number of odd jobs to do after the building itself is completed. Sidewalks and areaways have to be laid.

For such emergencies, as well as for the use of the contractor who does only a small amount of concrete work in the course of a year, a small general purpose mixer has been built by the Chicago Builders' Specialties Co., Old Colony Bldg., Chicago, Ill. It is called "The Little Devil." It has a loading platform 15½" from the ground and may be placed inside the sidewalk forms to spout concrete right into place. It is run by a 2 H. P. hopper cooled gasoline engine and has a mixing capacity of 40 cubic yards per day.

SAMSON SPOT SASH CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock, carefully inspected, and guaranteed free from all imperfections of braid or finish. Proved by both tests and long experience to outwear common cord or metallic devices many times over. Can be distinguished at a glance by our trademark, the Spots on the Cord. Send for catalogue and samples.

Samson Cordage Works, Boston, Mass.



Poured Concrete Construction

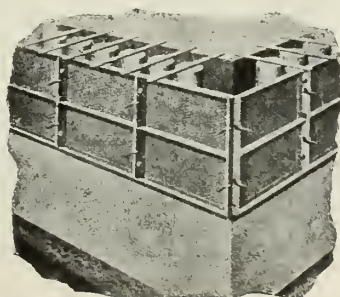
Concrete construction is rapidly narrowing down to **POURED** construction. Experience has shown architects and owners that buildings with **POURED** concrete walls, floors and roofs are best and cheapest.

Reichert Metal Molds were the first successful forms placed on the market for this kind of work. They have been improved upon. They are used all over the United States by careful builders who work under particular architects. Concrete houses in Europe are built with these forms. Reichert Moulds are quickly and easily erected, retain perfect alignment, withdraw easily and cut the cost of form work more than one-half.

The United States Steel Corporation used these forms in building scores of houses at Gary, Ind. One of the terraces is shown above. In every town of 3,000 inhabitants or over there is money to be made by the contractor who will use Reichert Moulds on his work. He can build better buildings and more of them. He saves money on every job where form work is required. His satisfied customers add to his business every year.

Something About Forms

Made of rustproof metal, reinforced with steel angles, Reichert Moulds are light and strong. They do perfect work because they are built mechanically right. Patent clamps hold sections rigidly in place as the wall mould is built up, piece by piece. All these points are fully covered by patents.



How to Learn More About This Kind of Construction

If you want to do better concrete work, at a lower cost and consequently greater profit, ask for our booklet on poured concrete construction and metal mould work. No work is too small, no job too large, for Reichert Moulds.

REICHERT
Manufacturing
Company

Milwaukee : Wisconsin

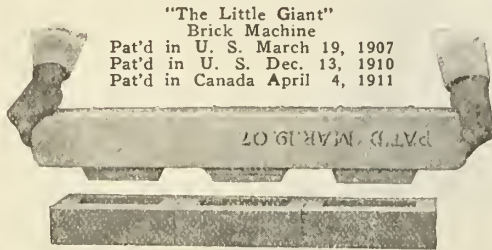
Money in Silo Work With Reichert Silo Moulds

In a few years, every silo built in this country will be of concrete. The same points that have made Reichert Straight Wall Moulds famous are found in our Flexible Silo Moulds. One set of molds with additional plates makes silo of any diameter. Reichert Moulds require less labor than others—with these molds you can meet competition. Let us send you a special folder describing our Silo Moulds. Write for this folder today before you forget it.



THE LITTLE GIANT BRICK MACHINE

OVER 4,000 LITTLE GIANTS IN USE



"The Little Giant"
Brick Machine
Pat'd in U. S. March 19, 1907
Pat'd in U. S. Dec. 13, 1910
Pat'd in Canada April 4, 1911

Special Price to mail order buyers.

LA GRANGE SPECIALTY COMPANY,

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LA GRANGE, INDIANA

WHY? BECAUSE—by the use of our removable cures you make nearly 6,000 BRICK out of same amount of material you would make 5,000 solid, and yet make a brick that will make a better wall. Ask your Masons. This saving will nearly pay labor cost.

YOU SAVE—cost of lumber for pallets by removing brick from the machine on the level ground, or any level surface.

BUT, IF—pallets are used, **NO BROKEN BRICK.** REASON, you remove brick LENGTHWISE of PALLET (see illustration) instead of crosswise. ASK those WHY who have had experience in removing brick out crosswise of pallet.

ANY SHAPE—brick can be made. THE "LITTLE GIANT" will make you money at every turn.

BIG THINGS—to look at if you are in the market for a brick machine. You ARE done experimenting when you buy a "LITTLE GIANT."

The Cummings system of reinforcement for concrete, exploited by the Electric Welding Co., Pittsburgh, Pa., is the subject of a small but complete catalog recently issued by that company.

"The Little Devil" 40-yd. mixer built by the Chicago Builders' Specialties Co., Old Colony Bldg., Chicago, Ill., is described in a neat folder being sent out by the company.

The United States Gypsum Co., Chicago, Ill., issues a folder containing specifications for using U. S. G. Bond Plaster for concrete walls and ceilings.

The American Trackbarrow, Lowell, Mass., is sending out a booklet describing barrows and cars for use in railway construction work.

A wire tightening device for use in securing concrete centering is described in a booklet just issued by the Milwaukee Device Co., 1287 National avenue, Milwaukee, Wis.

Metal shingles are described by the Empire Iron & Steel Co., Niles, O., in a circular being mailed to architects and builders.

The Moore-Simmons concrete block machine, which molds building blocks for two-piece wall construction, is illustrated and described in detail in a new catalog being sent out by the Iowa Foundry Co., Sioux City, Ia.

Some interesting views and construction data of the Keokuk Dam being built at Keokuk, Ia., are contained in an attractive booklet issued by the Atlas Portland Cement Co., New York City.

Specifications for the installation of U. S. Steel Sash are contained in a handsome book sent to architects by the Trussed Concrete Steel Co., 850 Trussed Concrete Bldg., Detroit, Mich. The book is filled with detail drawings and photographs and should be valuable to owners, architects and contractors interested in "daylight" factory construction.

Dealing with the important matters of waterproofing, damp-proofing and technical paints, a very readable book has been issued by the the Trussed Concrete Steel Co., 450 Trussed Concrete Bldg., Detroit, Mich. It tells what foterproofing and damp-proofing are, what they ought to accomplish and how. The special products of the company issuing the book are not neglected and an imposing list of customers and jobs is furnished the reader.

Piles that give no trouble to the owner are illustrated and described in a pamphlet published by the MacArthur Pile and Foundation Co., N. Y. C. The company is interested in promoting the use of the "pedestal" type of piles.

Methods of making concrete wearproof, dustproof and waterproof are briefly described in a four-page folder from the publicity department of The Master Builders Company, which has offices in the principal cities.

Cement Coating, made by Health & Milligan, Chicago, Ill., and pushed by F. J. Morse, of the United States at large, is the subject of discussion in an attractively written and printed book put out by the company. The text treats of cement coating and how to use it, and the illustrations show what it looks like and where it is used.

"Good roads require good culverts," says the book, "Concrete Culverts," printed for the Merillat Culvert Core Co., Winfield, Ia. "Good culverts" and "concrete culverts" are of course, synonymous terms. If you do not think so now, read the book and be convinced.

The Koehring Machinery Co., Milwaukee, Wis., makes concrete mixers, hoists and hoisting drums—and Mr. Koehring does not care who knows it. To prove it he has had printed a book showing what he makes, how he makes it and what the product is good for. Significant argument of popularity is furnished by illustrations of the Koehring plant, in the years from 1907 to 1911. The earliest plant could scarcely be found in the latest home of the company. A full line of concrete machinery and appliances is made in the new big plant.

A descriptive catalog, devoted to "Coltrin" mixers, which are made by the Knickerbocker Co., Jackson, Mich., is recently from the press and gives a very clear idea of these well known machines. Illustrations showing every part of the mixer, separately and assembled, with text telling why is part is made and shaped as it is, give the reader a very clear idea of what the "Coltrin" is and why it mixes good concrete.

YOU CANNOT LOOSEN A RICHMOND SCREW ANCHOR

(Patented)



YOU CAN'T TEAR IT OUT, WORK IT OUT, JAR IT OUT, OR PRY IT OUT. ONCE IN, IT IS THERE TO STAY.

The only way to dislodge a bolt put up with the Richmond Screw anchor, is to unscrew it. But you can screw it in and out as OFTEN as you please.

And for wear you have a metal-to-metal bearing. An expansion shield alone costs more than the Richmond bolt and anchor.

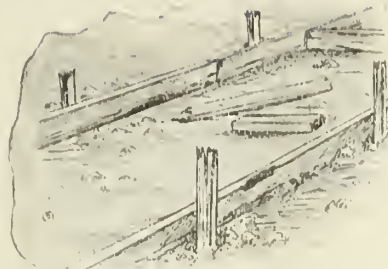
Thirty million in use.

Write for circular and sample.

Richmond Screw Anchor Co.

7 Church Street

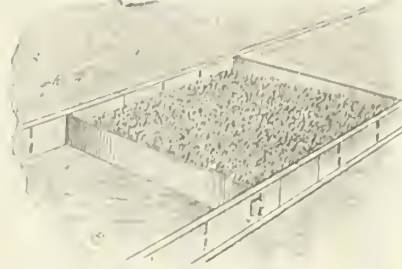
New York City



The Bungling way

Haul a load of warped and split lumber to the job, stake it and nail in into place, pour your concrete, cut the expansion joints with an ax, scrape up the concrete that has leaked out, save what lumber you can, buy more lumber for the next job, pay a big wage and wait for the owner to kick about the job.

Two Ways of building a Concrete Sidewalk



That Spring Wedge

An exclusive feature with Berger Forms. When your cross plates are inserted in the side rails, clamp them quickly and rigidly with this spring wedge. Cross plates are flush with top of side rails—don't interfere with strike-off.



The BERGER way

Lay down clean, straight, smooth metal forms, adjust the tight joints, slip in the dividing plates, line up the whole walk from the first section of forms laid. No stakes, no braces. Pour your concrete into rigid, tight forms. Draw the cross plates, leaving clean expansion joints. Remove side rails and use the whole equipment over and over again.

BERGER'S PRESSED STEEL FORMS

allow you to save on all four items of sidewalk cost—Labor, equipment, material and time spent on the job. They add to profits and to reputation. You can secure these forms for crosswalks, angle work and curved work. Buy just as many forms as you need and add to your equipment as required.

"Concrete Sidewalks" is a booklet that every sidewalk man should read. Send for a copy.

THE BERGER MANUFACTURING CO.

Canton, Ohio

FOR PROMPT SHIPMENT ADDRESS NEAREST BRANCH

New York
Boston

Chicago
Minneapolis

Philadelphia
San Francisco

Atlanta
St. Louis

"Raydiant" Sidewalk Lights, Ferro-Lithic Steel Plates, Rib-Truss Plates, Metal Lath, Metal Lumber, Multiplex Steel Plates, Galvanized, Black and Painted Roofings, etc.



← Can You Read This

It is a reduced photographic copy of the back cover of a publication issued by Deodato & Rubel, ornamental concrete workers of Alexandria, in far off Egypt. It is an appreciative reference to the fine work done in a

gentina. Also in every state and territory in the United States. More than 40,000 of them. And we are shipping more of them every day. We have not a single dissatisfied customer that we know of.

SIMPSON MOLD

The same publication contains illustrations of many other designs made in the Simpson Molds, a good many of which are in use in the Land of the Pyramids. Our molds are producing fine work in more than twenty foreign countries, from Hawaii to Trebizond in Turkey in Asia, and from Alaska to Ar-

gentina. Do not these facts indicate that Simpson Molds are O. K.? Sure! And they make it easy and safe for us to guarantee the molds absolutely. Every cement worker finds them profitable, no matter where located.

We want to send to Cement Men our full catalogue, and to all interested persons our illustrations of beautiful concrete verandas. Cement workers, please answer on their letter heads or enclose business cards.

THE SIMPSON CEMENT MOLD CO., 101 Vine St., COLUMBUS, O.

GENUINE BANGOR

Roofing Slate, Structural Slate, Blackboards

EAST BANGOR CONSOLIDATED SLATE CO.

Large Facilities

EAST BANGOR, PA.

Prompt Deliveries

STRONG COLORS FOR CEMENT

Red, Black, Buff, Green, Blue, etc.

C. J. OSBORN COMPANY 268 Water St.
New York, U.S.A.

All Concrete Surfaces Should be Waterproofed with **Driwal**

No preparation or treatment of the surface is needed. Works equally well on new or old work. Does not change the surface texture. Water, weather, acid and alkali proof.

White, Black, Transparent and
14 Permanent Flat Colors.

Send for Illustrated Booklet of Methods and Costs of Concrete Waterproofing and Decorating. (Color Card enclosed.)

Bilchaco Cement Floor Coating prevents dusting, saves wear, protects cement floors from oil stains. Six colors.

The Billings-Chapin Co.

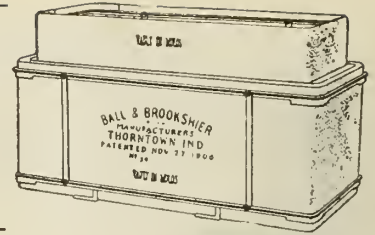
Boston Cleveland New York

THE HOOSIER CEMENT BURIAL VAULT MOLDS

All steel, no wood. Telescopes and adjusts for making twenty sizes of sinks, tanks, bath tubs or vaults. Makes vaults with circle corners, preventing cracks. Corners strongest portion of walls.

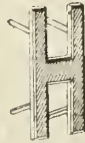
Ask for circulars Nos. 5 and 6 Agents wanted in every State.

BALL & BROOKSHIRE
Thorntown, Indiana



BRASS LETTERS

with spurs in the backs, for embedding in Cement walks. They make an attractive sign in front of business places and residences, and can be set in curb blocks and used for names of streets.

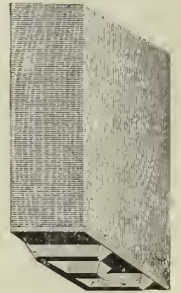


SUNKEN DIES FOR RAISED IMPRESSIONS
REVERSED LETTERS AND FIGURES MOUNTED ON BLOCKS FOR MARKING CEMENT WORK.

2 in. Letters and figures on Blocks . . .	\$6.30
3 " " " " " " " " " " " " " " " "	7.00
4 " " " " " " " " " " " " " " " "	8.40

Also name stamps. Send for illustrated price list.

H. W. KNIGHT & SON,
Box C. Seneca Falls, N. Y.



AGENTS WANTED

"CONCRETE" has a good proposition to make to live young men who will act as subscription agents. We want representatives to look after renewals and take new subscriptions. Ask for terms.

CONCRETE PUB. CO.
DETROIT, MICH.



Stained with Cabot's Waterproof Cement Stains.
George Nichols, Arch't, N. Y.

Cabot's Waterproof Cement Stains

The Only Artistic and Waterproof
Colorings for Cement Work

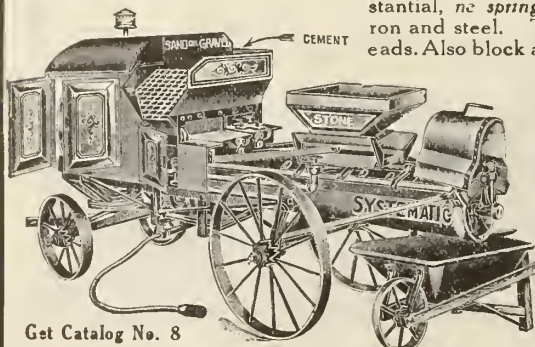
Being Stains, they are transparent and they sink into the pores of the cement, giving soft, velvety coloring or effects without gloss and without spoiling the texture of the surface as coatings do. They are not "painty" and are cheaper, easier and quicker to apply, go farther, wear better and are infinitely handsomer than any paint or coating. They cannot crack, peel or chalk, like coatings, because they are stains, not coatings.

Send for colors and full information.

SAMUEL CABOT, INC., Mfg. Chemists, BOSTON, MASS.
1133 Broadway, NEW YORK. 350 Dearborn Ave., CHICAGO.
Agents all over the country.

Systematic Concrete and Mortar Mixers 16 Styles 16 Sizes

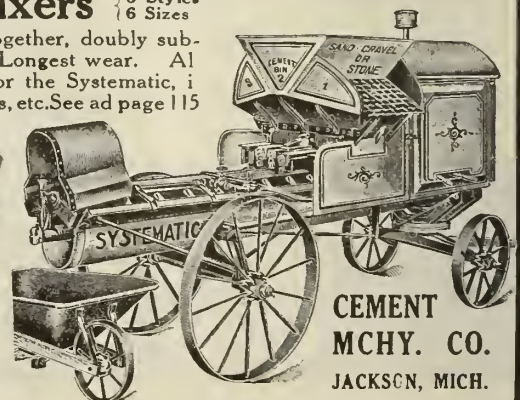
28 Exclusive advantages, per catalog No. 8—built with 2, 3 or 4 hoppers together, doubly substantial, no springs, chains or sprockets. Longest wear. All iron and steel. There's no substitute for the Systematic, leads. Also block and brick machines, molds, etc. See ad page 115



Get Catalog No. 8



The seal of satisfaction
from thousands of users



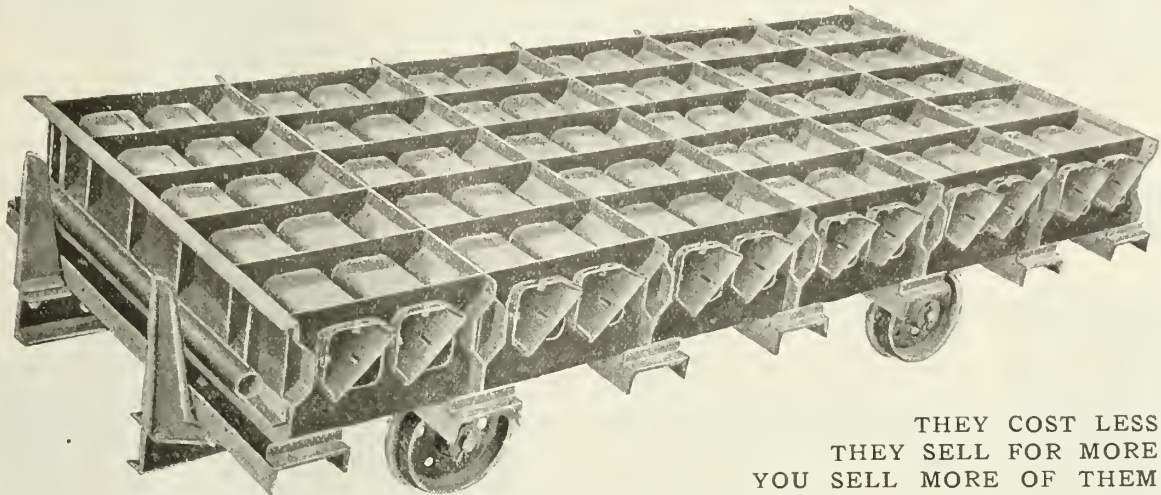
CEMENT
MCHY. CO.
JACKSON, MICH.

Zagelmeyer System

of Casting

Hollow Cement Building Blocks

The Zagelmeyer System uses a SLUSH CONCRETE for body of block and a patented process of applying the facing, which gives the block the most NATURAL STONE EFFECT of any block made. Blocks made by this system are GUARANTEED ABSOLUTELY WATER-PROOF, have THREE TIMES THE CRUSHING STRENGTH and are the handsomest blocks in the world. They sell for 25% more than the best dry tamp block and can be MADE CHEAPER than any other block on any other system.



THEY COST LESS
THEY SELL FOR MORE
YOU SELL MORE OF THEM

THE MOULDS IN THE ZAGELMEYER SYSTEM

are so PERFECTLY CONSTRUCTED that the faces of block are guaranteed not to vary the ONE-HUNDREDTH PART OF AN INCH IN SIZE. THE CORES pass through from one side of the car to the other; they are NON-TAPERING AND COLLAPSIBLE, and withdraw with perfect ease after cement has set. It is THOROUGHLY PROTECTED by PATENTS which enable us to give EXCLUSIVE TERRITORY. Secure your own city BEFORE SOMEONE ELSE DOES and get into a BUSINESS THAT PAYS. This is positively the best Cement proposition in the United States today.

MR. BLOCK MAKER.

Are you satisfied with your present system of block making? Are your customers satisfied with the blocks you sell them? Our system will satisfy both yourself and your customers. You will be satisfied because you can make the blocks for less money, can sell them for more and can sell more of them. Every customer is your friend and is boosting your business. Your customer will be satisfied because he will be getting a block so far superior to anything he ever saw that he simply can't kick and it makes him feel so good that he tells all his friends. A satisfied customer is the best advertisement you can get and our system certainly produces satisfied customers. Secure our system for your territory before your competitor does.

MR. CEMENT WORKER.

There is no branch of the concrete industry so profitable as making CAST CONCRETE BUILDING BLOCKS by our system. Their superior quality commands the respect of architects and builders and the LOW COST TO MANUFACTURE enables you to compete with all kinds of building material. There is practically no limit to the demand for such a cement block as our system produces, as architects readily specify them for all classes of buildings.

If you act quick enough you can secure the exclusive right to manufacture them in your locality, and you will then have a monopoly of the most profitable part of the concrete industry.

A postal brings our Catalog and Proof of our Assertions.

Zagelmeyer Cast Stone Block Machinery Co.

12 CRUMP AVENUE, BAY CITY, MICH.

EVENTUALLY You Will Use the "D & A" Molds, the "Shaking System," and make

D. & A. Reinforced Concrete Fence Posts

Am. Ry. Eng. & M. of Way Ass'n, after experiments and tests, endorse "D & A" MOLDS and POSTS most favorably. Many Portland Cement Companies use and recommend "D & A."

Now in use by over a dozen leading Am. Ry. Co.'s, i. e.: Pa. Lines, C. & N. W., Mo. Pac., Mich. Central, Lackawanna, etc.

"D & A" CEMENT POSTS CAN BE MADE AT FROM 12 TO 18c.

WITH THIS OUTFIT YOU CAN FILL, REINFORCE AND COMPACT WET-MIXTURE CONCRETE in ten post molds at one time. QUICKER, BETTER AND CHEAPER than by any other method now in use.

Ten molds are filled in one operation, reinforcement strips pressed down into the soft concrete to definite positions, by use of so-called "placing device" (a simple clever attachment supplied with the outfits).

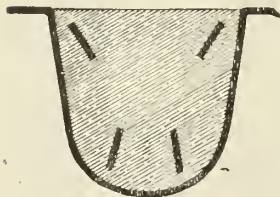
Horizontal vibration of the filled molds upon the supporting springs, thoroughly compacts the concrete in ten molds at one time, quicker than one can tamp a single post. (No pallets used.) The "Shaking" imparts to the post a smooth, dense surface, making it practically impervious to the entrance of moisture which would corrode the reinforcement, or in freezing burst posts, also giving maximum bond between concrete and reinforcement.

Detachable ends on molds are removed and mold springs away from post when releasing. Molds are then ready to be refilled.

Three sizes and three lengths of regular line post molds; two sizes anchor posts; special line anchor or brace post molds, also Telegraph and Telephone Pole molds subject to correspondence.

"D & A" POSTS ARE THE STRONGEST, CHEAPEST AND BEST POSTS MADE.

The shape of "D & A" POSTS being nearly square with exposed corners slightly rounded, gives maximum strength for minimum of materials and labor. No corners to fill or projections to break off in handling or removing from molds, allowing use of good coarse aggregate. Triangular posts are not equally strong from two opposite directions, round posts are very difficult to mold, impossible to hold reinforcement in position, necessitates pouring from raised platform.



Hoop steel reinforcement is recommended on account of ease and speed of placing by the use of the placing device furnished, which picks up the straight strips (cut to lengths) and pushes them down through the soft concrete to within about $\frac{1}{4}$ " of the surface of the post, where they will do the most good, at the same time being thoroughly covered and protected with $\frac{1}{4}$ " or more of concrete. The strips have large surface for bond with the concrete, at the same time a standard product, thus lowest possible cost.

However adaptable to any method of reinforcement, such as round, square or twisted bars, or any of the fabricated reinforcements which cost 15c. to 25c. each, which give no better results in the posts.

"D. & A." TIE WIRES and TWISTERS for applying, fasten any kind of fencing easily, quickly and securely any number of times or any place up and down the post, although corrugations, holes through post, both of which materially weaken the posts, or any of the numerous stapling devices may be employed.

"D & A" POSTS will stand all the strain required of them, can be made with common labor; as six and ten are made at one time, the labor cost is much less than by any other system. "D & A" POSTS are much lighter than many of the so-called light weight posts, also much stronger; the only correct principles for making fence posts are incorporated in the "D & A" MOLDS and the "SHAKING SYSTEM."

CONCRETE PRODUCTS PLANTS in all parts of the U. S. and over a dozen foreign countries are now using "D & A" equipment with success and satisfaction. There is a large demand for "D & A" Cement Fence Posts and we are daily referring customers to owners of "D & A" machines and molds. Specially adaptable to steam curing.

Our catalogue, "Concrete Posts and How to Make Them," is fully illustrated and gives the construction and operation of "D & A" MOLDS and MACHINES, and use of concrete posts in detail, giving names of users and Railway installations, with outlines for ordering equipment.

We endeavor to keep a reasonable sized stock on hand for immediate shipment at all times, and solicit your inquiries. Prices and discounts quoted upon request. Send for catalogue and circulars now.

D. & A. POST MOLD CO.

Offices and Factory, Three Rivers, Mich.
212 Third Avenue.

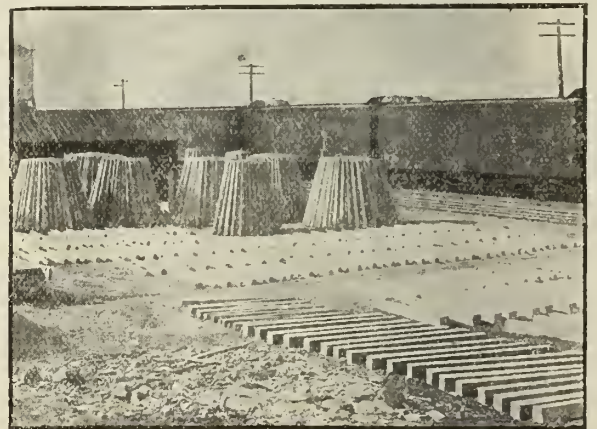
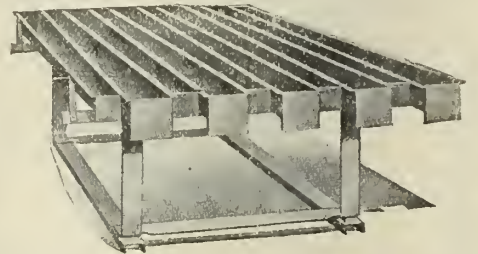
In writing Advertisers please mention CONCRETE.

TIME IS MONEY.

The "D & A" is the only equipment which makes TEN POSTS AT ONE TIME.

"D & A" TEN-mold outfit supporting ten individual molds up from the ground for convenience and speed of molding, no back breaking making posts down upon the ground or floor.

All steel, no castings or weak parts to break, no parts to wear out. Not one of the hundreds of "D & A" Machines or Molds has ever required a cent's worth of repairs.



"D & A" Cement Post Plant owned and operated by the C. & N. W. Ry. Co., Dunlap, Iowa. One complete machine with 250 extra line molds, and 25 Anchor molds. Over 30,000 posts have already been made at this one plant. The square posts in foreground are "D & A" anchor posts, with line post getting initial setting in center before piling on end to economize space as shown in background.

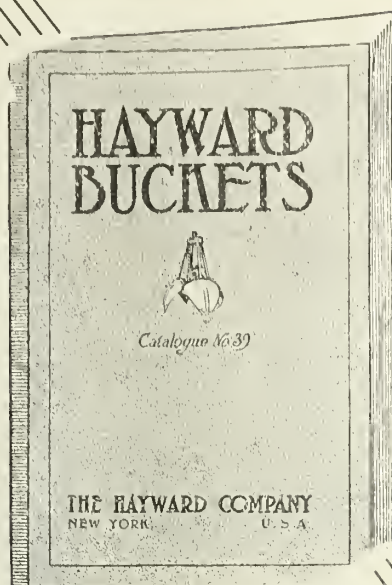
Cost of Manufacturing "D & A" Concrete Posts.

Material and labor,	Average cost.	Will make.	Average per post.
1 yard gravel.....	\$0.20 — .80	40 posts	\$0.00½ — .02
1 bbl. cement.....	.80 — 1.20	24 posts	.04 — .05
3 or 4 strip reinforcement, 2 to 2½ lbs.	.02½ — .03	for each post	.05 — .08
2 men 1 hr., 15c to 25c	.30 — .50	15-20 posts	.02 — .03

Total cost per post.....\$0.11½—\$0.18

The above estimate is based upon a 1 to 4 mixture, and would be reduced considerably in a 1:2:4 mixture as some are using.

We Want to Send this 40 Page Book to Every Engineer and Contractor Who Uses Automatic Buckets



It fully describes Hayward Buckets and their parts. It is, in fact, a reference book, being the most complete catalog ever issued on the one subject of Buckets.

To the Engineer who specifies Automatic Buckets—to the Contractor who uses Automatic Buckets, this catalog will prove invaluable. Write for your file copy today.

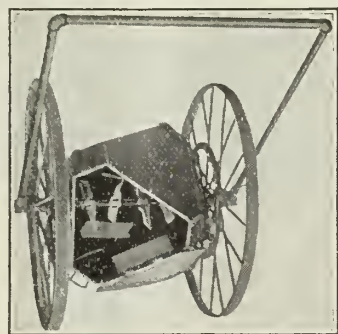
Orange Peel Buckets
Clam Shell Buckets
Drag Scraper Buckets

The Hayward Company

50 Church Street

New York

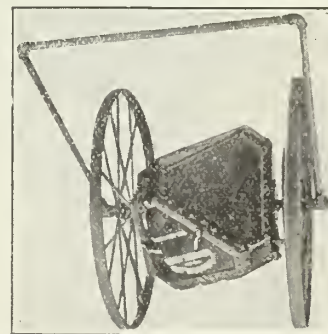
Arnold Concrete Mixer



A hand Traction Mixer Completely Operated by Two Men

NO CRANK TO TURN.

Concrete Mixed While the Materials Are Being Wheeled from the Stock Piles to the Forms.



THE ONLY REALLY PORTABLE MIXER ON THE MARKET.

It does away with the use of wheelbarrows, mixing boards and mortar boxes. Mixes, conveys and deposits, all in one operation. ONLY ONE HANDLING OF THE MATERIALS.

If You have No Mixer Here is Your Chance to Get One, at a Low Cost, that will Enable You to Compete with Anyone

If You Have a Power Mixer You Need the Arnold Mixers to Use on Your Flat Work and Small Jobs.

Capacity, per man, 5 cubic yards, mixed and placed, per 8-hour day.

Write today for full particulars to,

(Agents wanted in unoccupied territory.)

F. T. ARNOLD

224 Williams Street.

NEW LONDON, CONN.

C. F. Blount, Southern Sales Agent, 522 Grant Bldg., Atlanta, Ga.

This Valuable Hand Book on Waterproofing And Finishing Free!

A FEW OF THE SUBJECTS TREATED

Dampproofing—

Transparent treatment applied to exterior exposed walls.

(Opaque, decorative coating applied to exterior masonry walls.

Special bituminous coating applied to the interior of exposed walls

Waterproofing—

Integral method used throughout the entire concrete mass, applicable for foundations, tunnels, reservoirs, cisterns, tanks, etc.

Integral method applied in a waterproofed plaster coat

Membrane method applied to general substructural work.

Membrane method applied to culverts, bridges and similar structures.

Enamels and Interior Finishes—

For general wood, metal, brick and plaster walls.

For highest quality enamel finish.

For general industrial plants, Hospitals, Sanitariums, Etc., Dairies, Creameries and Concrete Floors.

Protection of Iron and Steel—

Exposed to elementary conditions, Brine and condenser pipes, coils, etc. Stack Enamel and Boiler Front Enamel.

Acid Conditions



Contains complete discussion of the latest scientific and practical information on the subject of waterproofing, dampproofing and the application of technical finishes and paints; detailed instructions and specifications for applying various systems and materials; a thorough discussion of the methods best adapted for a large variety of conditions; many interesting illustrations and descriptions.

Every man interested in waterproofing or dampproofing structures (both above and below ground) of concrete, masonry and brick work, or in finishing interior and exterior surfaces of concrete, brick, masonry, wood, plaster and steel, will find valuable pointers in this carefully prepared reference book.

The TRUS-CON COMPLETE HAND BOOK will be sent FREE, with useful suggestions, if you will write us about your proposed work.

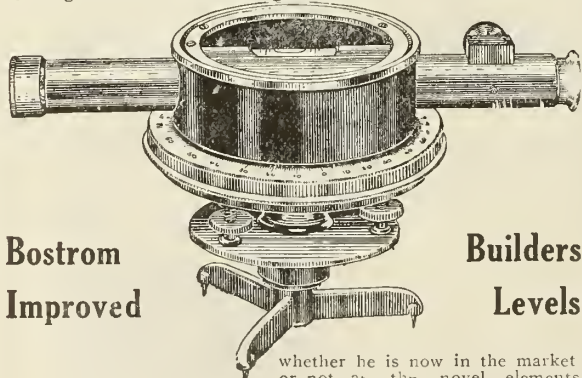


TRUSSED CONCRETE STEEL COMPANY

450 TRUSSED CONCRETE BUILDING, DETROIT, MICHIGAN

UNANIMOUS ENDORSEMENT

of purchasers in every State and practically every County in the Union makes it the duty of every man who has need for a leveling instrument to investigate the



Bostrom
Improved

Builders
Levels

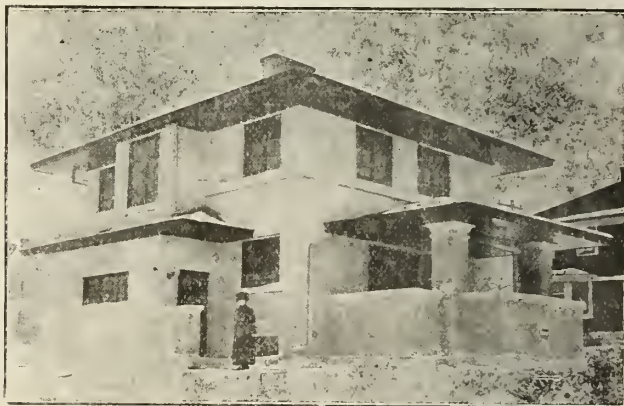
whether he is now in the market or not, as the novel elements of construction entering into the Bostrom Level afford means for proving the accuracy of the work which we GUARANTEE is not surpassed in even the most expensive engineering instruments, and that feature when combined with their simplicity affords ease and quickness of adjustment and operation which marks the greatest improvement made in leveling instruments during the last quarter of a century.

That Bostrom's Levels fill a long felt want among all classes requiring the use of a dependable instrument, is best indicated by the demand already created throughout the continent which has resulted in our manufacturing in such quantities as to save the purchaser about one-third the cost of the old familiar type architect level, as the price of our No. 3 is only \$25.00, and No. 4 only \$30.00; either outfit including tripod, graduated rod, target, plumb-bob, etc.—the only difference being in the magnifying power of the Telescopes, No. 3 being 10 diameters, and No. 4 being 18 diameters. Prices named are F. O. B. New York, Atlanta, St. Louis, and all Pacific Coast cities. Shipping weight, 15 lbs.

If not sold in your town, will ship direct on receipt of price; or will ship C. O. D. SUBJECT TO APPROVAL—money back, including all express charges paid, if dissatisfied, or disappointed in any respect after thorough trial.

Order direct from this announcement or write for illustrated description. Our reliability guaranteed by this publication.

Bostrom-Brady Mfg. Co., 138 Madison Ave., Atlanta, Ga.



Erected with Van Guilder Hollow Wall Concrete Machine

Only 12 Months on the Market and Building from Coast to Coast.

The labor generally employed for making building material such as blocks, brick, tile, etc., we utilize to erect the building, thus cutting out manufacturers' expenses and profits, transportation charges, etc., which are very considerable items.

OUR WALLS ARE STRONGER

being double and monolithic from footing to roof plate with a continuous air space everywhere between the double walls,—a house within a house. The walls are tied together, also steel reinforced horizontally every 9" high.

OUR BUILDINGS ARE WARMER IN WINTER, COOLER IN SUMMER

Damp proof	Vermin proof	Cost less
Frost proof	No maintenance	Sell higher
Fire proof	Everlasting	

OUR SILO MACHINES

build the best silo walls in the world. No freezing of ensilage. No vermin. No repairs. Stand forever.

Send for Illustrated Folder. Put in your order for a machine, and get a few years' start of your competitors.

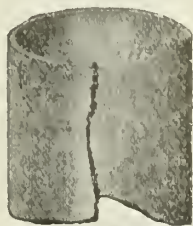
Van Guilder Hollow Wall Company.

728 Chamber of Commerce Bldg. Rochester, N. Y.

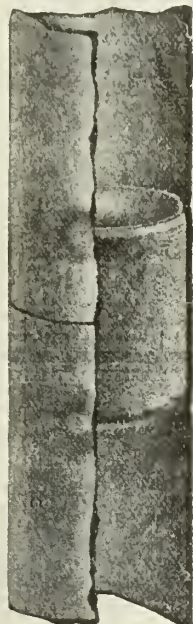
Simmons Sectional Concrete Pile Casings

Are Carrying the Dead Loads of Buildings and the Live Roads of Railroads

Over 2,000 Linear Feet are Supporting New York Structures



For underpinning and where head room is limited, this construction of a pile is unequaled.

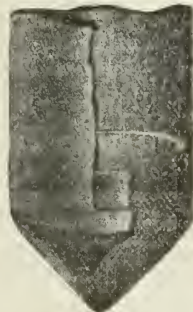


We have instances where a pile has been driven over sixty feet without losing its alignment or buckling.

They can be hammered, jacked or jetted in place. Piles of any ultimate length can be built up during the progress of driving.

The sections can be made from 4 to 20 feet long to suit the conditions. Our stocks can be drawn from to supply any desired length of piles.

Send for circulars and prices.



We are equipped for all kinds of Special Machine Shop Work—in Piping, Columns, Railings, Roof Structures, Cold Storage, Flag Poles, Fittings, Valves, Tools and Specialties for Contractors, Engineers, Water Works and Industrial Plants.

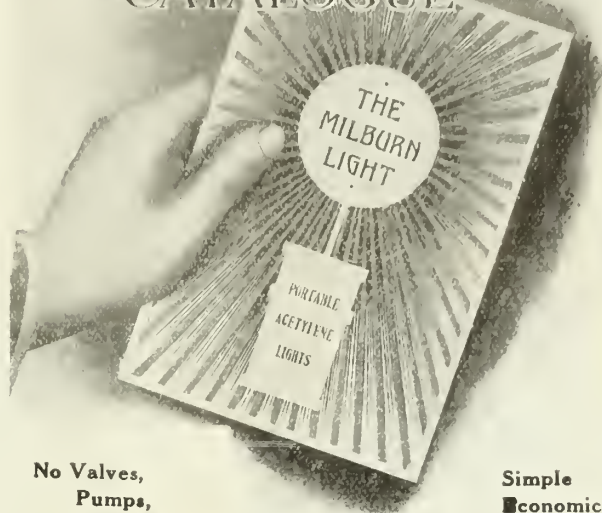
John Simmons Co.

101 Centre Street

New York

Milburn Acetylene Lights

SEND FOR NEW 48 PAGED CATALOGUE



No Valves,
Pumps,
Gauges

Simple
Economical
Reliable

50 to 24,000 Candle Power

For Concrete and all Kinds of Construction Work

THE ALEXANDER E. MILBURN CO.

505-507 W. Lombard St.

BALTIMORE, MD.

Ottawa Silica Company

Ottawa, Illinois

Largest Miners and Shippers of White Sand in the United States

Washed and Steam-Dried

White Sand

Unexcelled for

Facing Concrete Blocks, Ornamental Concrete Stone, White Plaster, Exterior Plastering, Roofing, Sawing Stone, Marble, etc.

You can order less than a carload, in fact shipments as small as five 175 lb. bags can be delivered economically

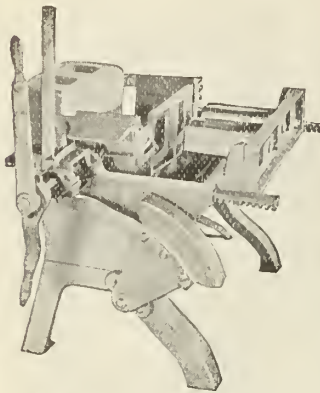
Analysis 99.90 Pur Silica

Prices, Freight Rates and Samples on Application

HAYDEN CONCRETE BLOCK MACHINERY

buy of an old established company, one that you know is going to be in business in case you want repair parts, or want to add a second machine to your equipment. Our line is large. Tell us just what machines you are interested in and we'll send booklets describing those machines.

Our line of machinery today represents the best ideas for mixing and molding concrete into building units. When you buy a Hayden machine you

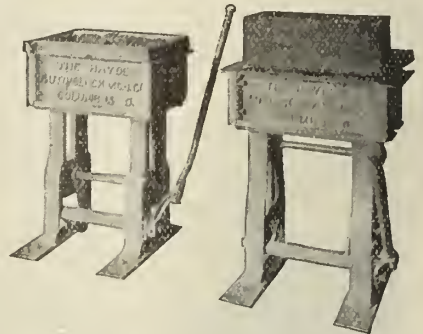


Hayden Automatic Face Down Block Machine

Made in the following sizes: 16, 18, 20, 24, 32 and 36 inch. Built on correct principles—one of the oldest face-down block machines on the market. It has been kept right up to the minute with modern improvements.

Hayden Stripper—For Plain Face Block

The Hayden Stripper is used in turning out standard blocks of plain design, for stucco walls, foundations, etc. It pays for itself quickly. You don't have to operate an expensive machine on a low-priced product—make your plain blocks on the Stripper. Wet mix may be used.



Any Pallet Will Fit Them: We build these machines to fit any pallet no matter what size or make, at no extra cost to you.



Concrete Mixers

Highest grade concrete mixers. Write us before buying.



Block Maker's Trowel

Only trowel on the market designed specially for the block maker. Blade of the best saw steel, highly tempered and polished, with edges slightly rounded. Size 12 in. long, 5 in. wide. Very durable; brass handle; adjustable so worn blade may be replaced by a new one.



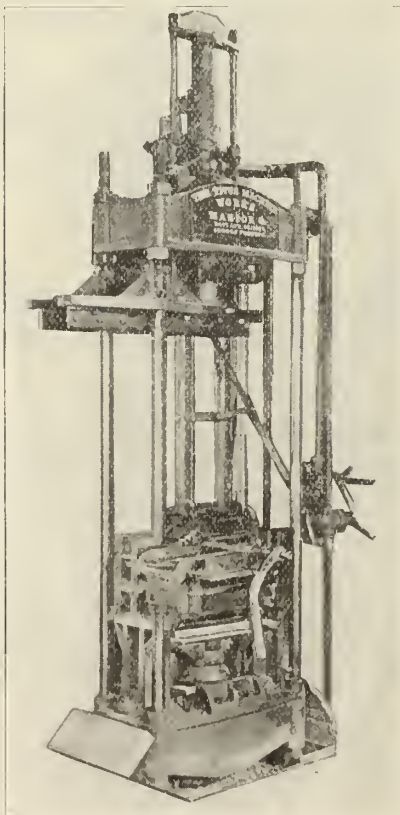
Ornamental Molds

You can order molds for a few ornamental pieces—pedestals, columns, caps, etc.—and as the demand increases for product, add to your line. Ask about our adjustable Angle Molds, adjustable Sill and Lintel Molds, etc.

HAYDEN AUTOMATIC BLOCK MACHINE COMPANY

112 West
Broad St.,

Columbus, Ohio



Titus Hydraulic Block Machine

Forms concrete block of wet material under enormous hydraulic pressure, applied from above and from below simultaneously. Makes block any size, shape or style. Makes them fast. They're waterproof. Requires small amount of power. Titus block are the strongest concrete block made and command a good price in the market.

Our Proposition

We have perfected this press and have given it a two years' trial in actual use. To introduce it we are making a special low price on the first machine sold in each state.

We cannot ourselves properly cover the territory outside of Ohio and are offering outside territory at a remarkably low figure. For full particulars, address,

Titus Machine Works

Marion, Ohio.



COMMON SENSE

Tells You This Wall is Waterproof

Water can't pass through metal ties. It can pass through any concrete connection between the outer and inner wall of a house.

Blocks made on our block machine make a wall like the one shown. These blocks sell easily. They please architects and owners.

The machine is easily operated. One man can make and rack 150 blocks per day. Get out of the old rut and buy a machine that will put you beyond the reach of competition. Write for our catalog. It'll show you how to get out of the woods—how to make money in this concrete business.

**Cherry Valley
Iron Wks.**

Monroe, Wash.

Agents Wanted

All over the country, to handle this machine. No agent need apply who handles any other block machine.

Three Ways To Tell GANDY Stitched Cotton Duck Belting

Every GANDY BELT has three distinctive marks by which you can always recognize it.

- 1st—The Green Edge
- 2nd—The Trade Mark
- 3rd—The Brand—T

Unscrupulous imitators make us take these precautions to protect you.

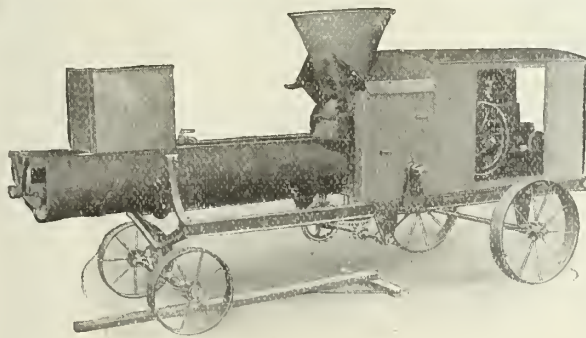
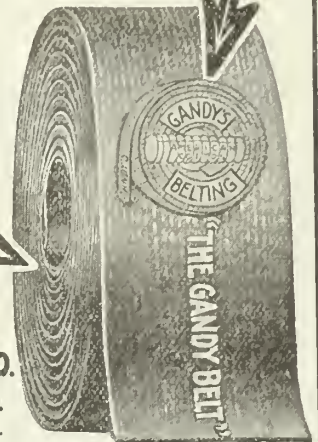
COST

Remember the net cost of "THE GANDY BELT" is only 1-3 of that leather belting and 2-3 that of rubber belting, while it does the work equally as well. Write for Samples Today.

**Be
Sure
To Look
For The Belt
With The
Green Edge!**

The Gandy Belting Co.

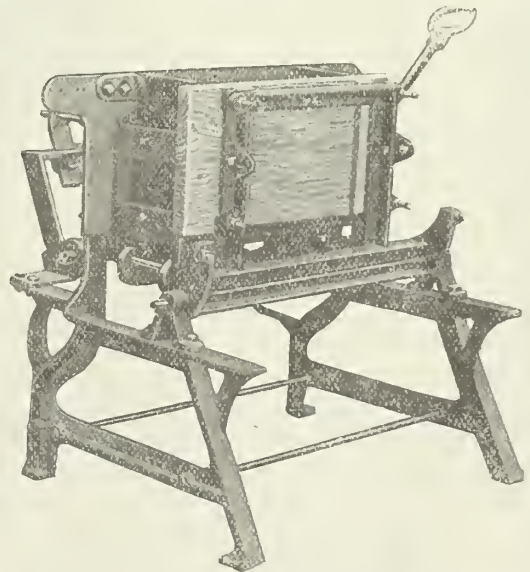
735 W Pratt St. Baltimore Md.
New York Office 88-90 Reade St.



CONTINUOUS MIXER, cheapest and best. Write for prices and description. A fine machine.

Adjustable Block Machine No. 4

All blocks Face Down, having Lever Drawn Cores. Cores being Oval makes tamping easy. Makes all Standard size blocks, having many designs of faces. A machine for rapid work. A great machine for little money.



Special Machine for This Kind of Work

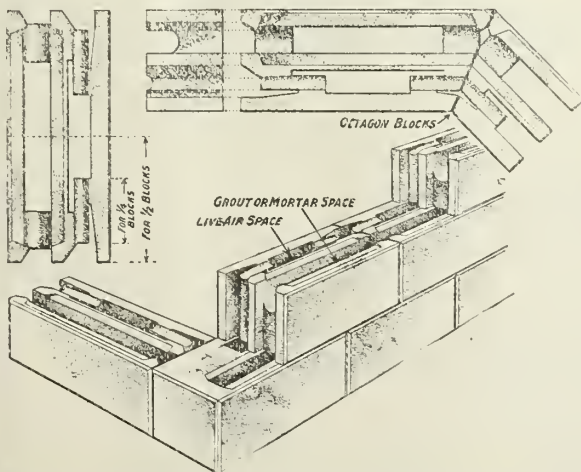
Not an Experiment, but the Best Thing Ever.

A NEW PROCESS of making Cement Blocks, called "Cement Block Forms." Blocks laid up DRY, having two compartments, inside with a ZIGZAG Air Space, outside to be filled with a coarse slush grout and lime mortar. Every joint sealed. An absolute DRY WALL. Closest of joints; no mortar-daubed blocks; much quicker laid, and a far better wall is the result.

All kinds of Concrete Machinery, such as Brick, Tile, Chimney, Cap and Sill Block Machines and Mixers.

J. C. Miller Block Machine Co.

JACKSON, MICH., - - - Foot of Clark St. and M. C. R. R.



MASON SAFETY TREAD

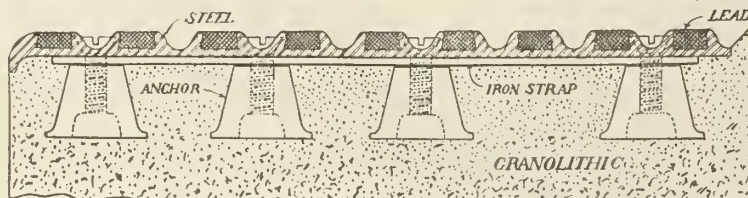
THE ONLY PERFECTLY SAFE TREAD

Should be used on all STEPS—ESPECIALLY CEMENT, also on all public floors and sidewalks. An absolute preventive against slipping on stairs, landings, inclined ways, car steps, sidewalks or any place that may become smooth. Can be fastened to anything, new or old. Will outwear any other surface. In use in every commercial center in America. Write for catalog giving full description and showing where it is in use near you.

American Mason Safety Tread Co., 704 Old South Building, Boston, Mass.

7 1/2" WIDE WITH NOSING EDGE

MASON SAFETY TREAD



15 Days Absolutely Free Trial

You to be sole judge at the end of that time—
if you will purchase a Sanford Press Block Machine.

It is a fact that concrete blocks made by the pressure method are more dense, more uniform, with sharper corners that are as dense as the center of the block, than can possibly be made by the tamp method.

This means more profits.

It is a fact that in the saving of labor cost alone you can pay for a Sanford Press in six months' time, to say nothing about the better quality of block that you turn out.

This means more profits.

It is a fact that you can double your output on a Sanford Press with the same amount of labor cost. You will have no trouble in securing men because the work is easier, and your blocks at the end of the day have the same density as the first block made in the morning. **This means more profits.**

This machine is interchangeable and can be adjusted to make blocks from 4 to 24" in length, 6 and 8" height of face, 4, 6, 8, 10 and 12" thickness of wall; fractional parts to full capacity of the machine are made at one operation, and any

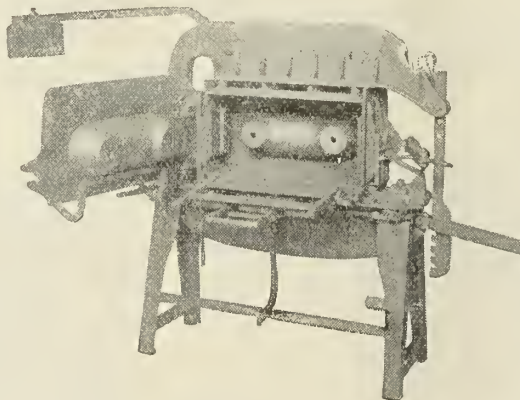
face design that may be desired.

You can make any curve or angle block, header bond two-piece system, metal tie two-piece system, slab or veneer block, hollow block, with vertical and horizontal air space, silos, water tables, etc.

You can face your block on one or all four sides at one operation of the machine. In fact, you can make anything that is ordinarily required in building construction.

It is absolutely the only down-faced hollow block pressure machine on the market, and is protected by

broad basic patents.



**SEND FOR
MIXER PROPOSITION**

You take no risk—just say the word and a "Sanford" will be placed in your plant to be tested out to your own satisfaction for 15 DAYS.

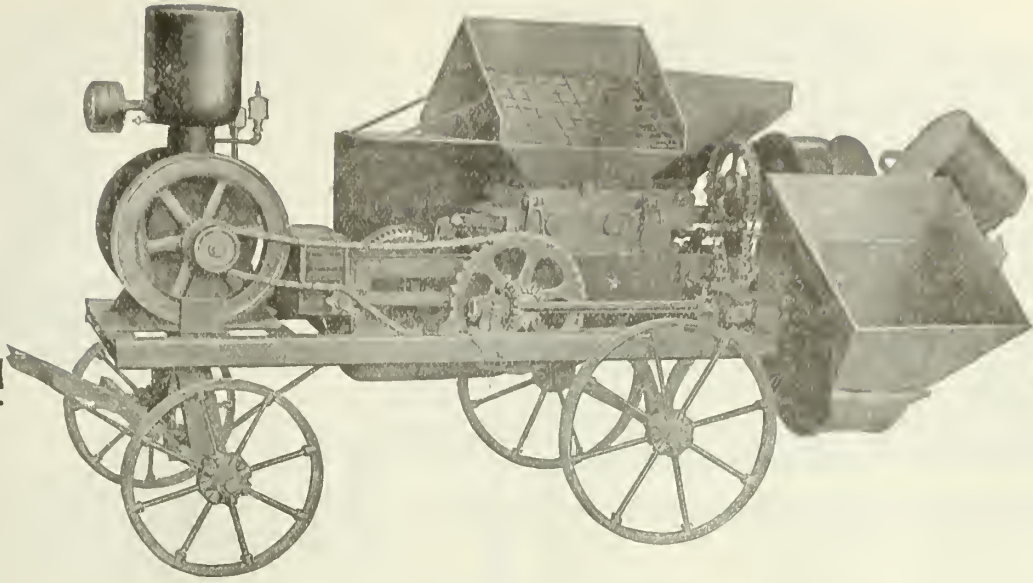
ABSOLUTELY FREE TRIAL

You are under no obligation at the end of the free trial—if you can fairly say that the "Sanford" does not turn out a better block and more of them—you send it back.

Think of that. Write today and get full information on the GREATEST BLOCK MACHINE offer ever made. Send us your name and address and we will send you a proposition that will certainly open your eyes. Be on the safe side and write us NOW. There is not a better machine made at any price. Don't wait—do it now while you think about it.

The Sanford Concrete Machinery Company

Suite 503 The Nasby Building
TOLEDO, OHIO



U. S. Standard Senior B. Concrete Mixer

This type of the well known U. S. Standard Self-Proportioning Continuous Mixers is a three-hopper machine designed for general contract work. It accurately proportions cement, sand and gravel or stone up to 2½ in. in diameter, and feeds these materials positively. Capacity, 90 to 100 yards per day. Note the low down stone hopper.

Special types for all kinds of concrete work. Ask about our Block Plant Mixer, mounted on steel base.

Get Our Catalog

Our new catalog D will save money for you. Lists continuous mixers and face-down block machines.

Write for a copy today.

The Ashland Steel Range & Mfg. Co.

MANUFACTURERS OF

U. S. Standard Concrete Machinery
ASHLAND, OHIO.

U. S. Standard Face- Down Block Machine

One of the oldest face-down machines on the market. From four to six oval cores in each block, cutting down material costs without weakening the block. Use wetter mixture than with other machines.

If you are in the market for a block machine, write for full information about the U. S. Standard.

TAKE OUR WORD FOR IT

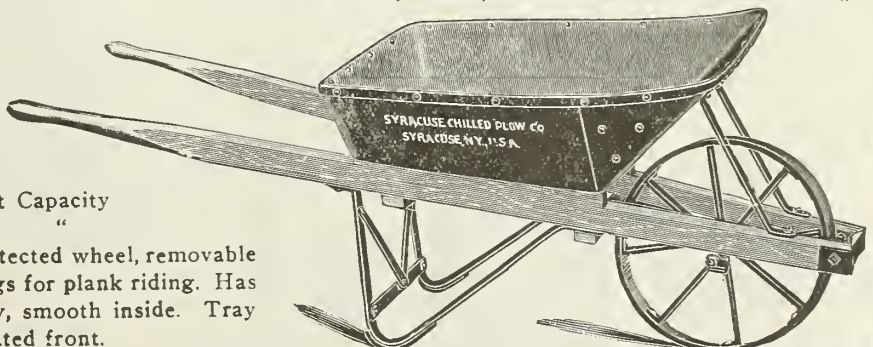
THE MOST PERFECT BARROW FOR HANDLING LIQUID CONCRETE, SAND, GRAVEL AND BROKEN STONE

ORDER A TRIAL LOT ON OUR SAY SO

After that you will never be in doubt
as to what Barrow to buy

No. 75-A 3½ Cubic Feet Capacity
No. 79-A 4 " " "

Is an end dumping Barrow, has protected wheel, removable shoes on legs, cross bar between legs for plank riding. Has an extra strong strapped steel tray, smooth inside. Tray placed well forward and with elevated front.



SYRACUSE CHILLED PLOW COMPANY, SYRACUSE, N. Y.

In writing Advertisers please mention CONCRETE.

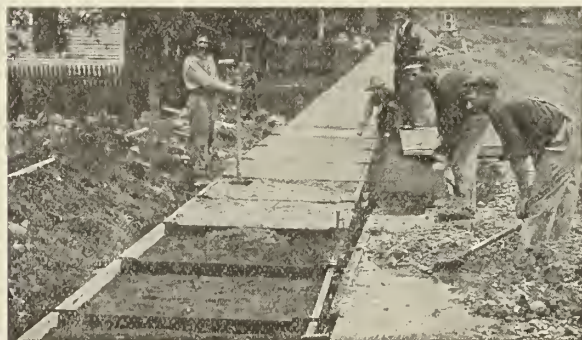


Zeiser Sidewalk Forms

The First Sidewalk Forms to be Placed on the Market---They've Been First Ever Since

You will find that it's money in your pocket to throw away your stakes and braces and expansion joint cutting tools—go at the sidewalk business right by using modern methods that mean economy.

Zeiser Forms enable you to do the best work for the least money. They are quickly set up, easily taken down, can be used over and over again, and will be as good as new at the end of the season. Insure a perfect expansion joint at every cross joint, and reduce labor cost 50 per cent.



Zeiser Tie and Dividing Plates are for use with wood side-rails. Their cost is but a trifle compared with what they will save you. Zeiser All Steel Sidewalk Forms consist of steel side-rails, steel dividing plates, quarter circle curves, flexible side pieces, and extension side-rails. They constitute the most modern and up-to-date sidewalk equipment in existence.

Our new self-locking device requires no wedges, bolts, keys, or hooks. You can have forms equipped with either this new lock or with a wedge lock or with both.

We know we have the best—Let us show you.
Write for Prices and Information.
Don't Delay—Do it Today.

Zeiser Brothers

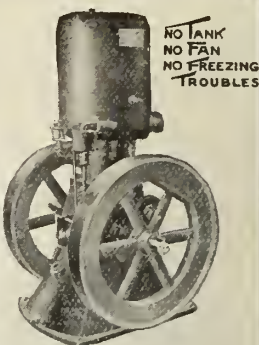
1318 E. 8th St., Berwick, Pa.

All Working Parts Are Protected from Dirt

That's one reason why the Novo Engine is so well adapted to cement work.

Another big advantage of this vertical, four-cycle engine from your standpoint is its steadiness—freedom from lateral vibration.

You needn't fear cold weather, for the Novo has a self-contained, cooling system guaranteed proof against freezing troubles. The



"The engine for every purpose."

NOVO ENGINE

is simple in construction, easy to start and run in all weathers, readily portable. It's the lightest engine for power developed. Made in from 1 to 10 H. P.

Send for Novo Catalog

and then tell us if you have ever seen an engine better adapted to concrete work. Send for the catalog before you forget it.

Novo Engine Co.,

Clarence E. Bement, Sec'y and General Mgr.

221 Willow St., Lansing, Mich.

Write for facts and figures.

"CONCRETE" LINER ADS COST LITTLE THEY SELL THE GOODS

\$1,000,000

The great poultry industry of our present day is generally referred to as the Billion Dollar Industry. These figures are based upon the census as prepared by the United States Department of Agriculture at Washington, D. C. The production of poultry and eggs, therefore, must be reckoned as one of the foremost money-making pursuits. For twenty-two years

FARM POULTRY

the leading publication devoted to profitable poultry keeping, has been teaching everything worth knowing about the most successful ways and methods of Incubating, Brooding, Rearing, Feeding, Housing, Mating, Exhibiting, Killing, Dressing and Marketing of poultry for greatest profit. Professors of Poultry Husbandry at the leading Agricultural Colleges and Experiment Stations recommend FARM POULTRY as the sanest, safest and most reliable poultry paper published. Issued on the first of every month, and subscription price is but 50 cents per year. Price to Canada, 65 cents per year. Foreign countries, 75 cents. A sample copy is free.

FARM-POULTRY PUB. CO.,
Boston, Mass.

Wholesale Prices On All Concrete Machinery

Block Machines, \$10 to \$250; Brick Machines, \$22 to \$75; Mixers, \$24 to \$1,000; Porch Column and Baluster Outfits, \$15 to \$75; Cap and Sill Moulds, \$12 to \$35; Lawn Vases, \$15 to \$25; Ball Moulds, \$2 to \$17; Grave-stone Moulds, \$7 to \$69; Well Curb-ing Moulds, \$4 to \$7; Drain and Sewer Tile Moulds, \$6 to \$83; Block Cars, \$11 to \$17; Fence Post Moulds, \$7 to \$12; Silo Moulds, \$14 to \$150; Coping Moulds, \$18; Hitching Post Moulds, \$20; Baluster Moulds, \$6 to \$18; Jardinieres, \$12; Special Gate Post Moulds, \$10 to \$30; Burial Vaults, \$90; \$14; Grave Markers, \$7; Rock Crushers, Sand Crushers, Sand and Gravel Elevators, Sand Screens, in both Revolving and Stationary Type, Mortar Gauges, Wheelbarrows, Jointers, Groovers, Edgers, Corner Tools, Curb and Gutter Tools, Corrugating and Radius Tools, Roller Jointers, Brick Tongs, Curb Clamps, Curbing Edgers, Hawks, Floats, Line and Indentation Rollers, Tampers, Rammers, Name Stamps, Indentation Letters, Wall Plugs, Expanded Metal and Water Proofing, Flower Pots, etc.

Northwestern Concrete Machinery and Tools

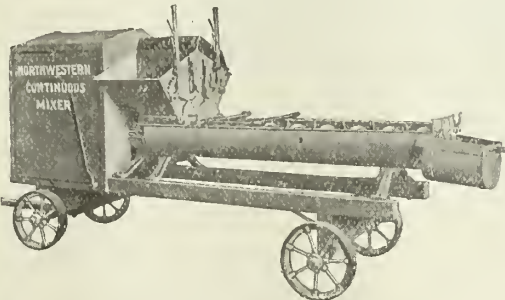
Send for 1912 Catalogs

Why not save 15% to 50% on your concrete purchases? No matter what you may be in need of, you will find it listed in the big Northwestern Catalogs, which show the largest and most complete line of concrete machinery in existence. Everything from the smallest type of hand machines to the largest size power machines built. We build these machines complete in our own factories and therefore can save you from 15% to 50%, as we make no extra charge for patents or territory rights.

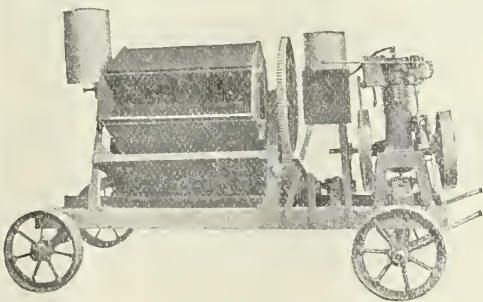
Machinery shipped on ten days' trial with returnable privilege if not entirely satisfactory. No strings attached to this guarantee; money refunded if not entirely satisfactory.

Write and tell us what you may need; and be sure and get our catalogs before you buy any machinery, as they are regular encyclopedias of concrete machinery.

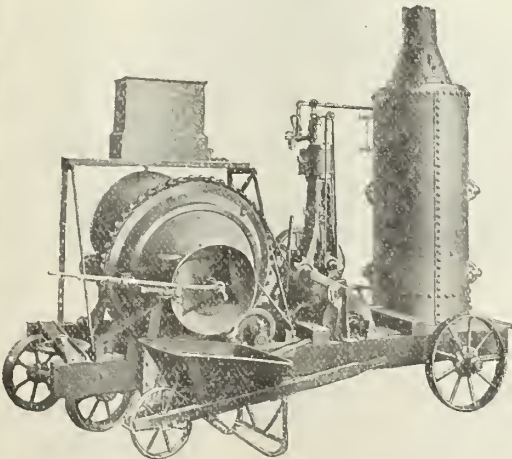
Northwestern Continuous Mixer



Northwestern Sidewalk Mixer



Northwestern Cone Batch Mixer



Northwestern Mixers

The Northwestern line of mixers includes everything from the smallest type of hand batch mixers up to the largest size power machines built. Machines designed for every conceivable purpose and at prices you wish to pay.

As an example—the low down cone batch mixer, illustrated at the bottom of this page, is built in all sizes from seven cubic feet up. Contains the mixing principles of the cone, cube and polygon shapes, with a whirlpool and shower effect that has never been duplicated in mixing machines. We guarantee absolutely this machine will save you from \$60 to \$100 per month on labor costs; that it will require less repairs; will be easier and more quickly operated, with better and more mix per day than other types. Let us tell you more about the large line of Northwestern Mixers, and write what style machine you want and for what purpose.

Write for Catalogs

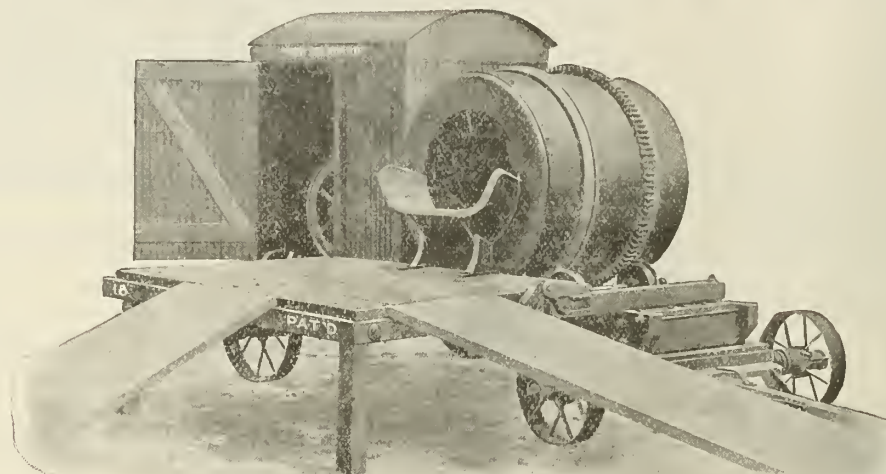
Be sure and write for catalogs which show the full, complete Northwestern line of mixers; also our general catalog showing other lines. State what you are interested in so we can quote complete prices. It will be worth your while to do this.

Northwestern Steel and Iron Works

1082 Spring Street, Eau Claire, Wis.

“The Standard”

Low Charging Concrete Mixer



Don't think, when buying "The Standard" Low Charging Concrete Mixer, that you will not be better pleased with the outfit than you would if you paid two or three times as much for other complicated machines with side loading hoppers and mechanism.

Many contractors using "The Standard" Low Charging Concrete Mixer, say that they would not exchange it for any other machine at any price.

In addition to our low charging mixers, we also have special designs for peculiar requirements, such as the—

"The Standard" Low Charging Mixer with Folding Platform. Shown in illustration. Platform down in mixing position.

"The Standard" Low Charging Mixer with belt drive.

"The Standard" Low Charging Mixer with cart charging arrangement.

"The Standard" Low Charging Mixer with discharging trough for street work.

"The Standard" Low Charging Mixer with hoist for mixed concrete.

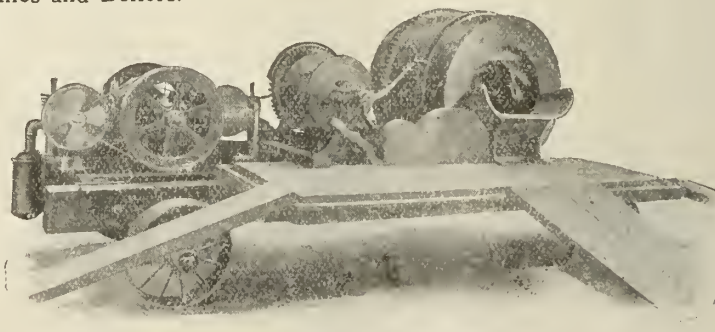
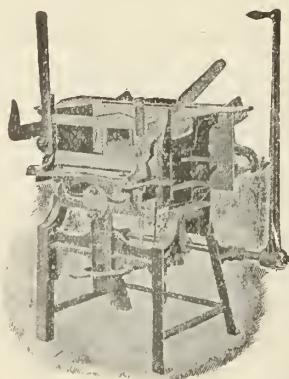
The Eclipse Stone or Block Machine.

The Perfect Brick Machine.

"The Standard" Hoists and Elevators.

Gas and Gasoline Engines.

Steam Engines and Boilers.



Ask for catalogue No. 36. The information in this catalogue will be of value to you.

The Standard Scale and Supply Co.

Chicago

1345-1347 Wabash Ave.

Pittsburgh

243-245 Water St.

Philadelphia

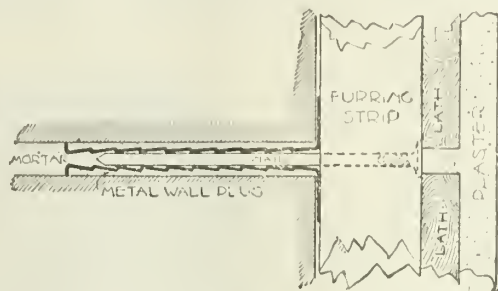
35 South Fourth St.

New York

136 West Broadway

Just the 'Thing'

For
Securing Interior Finish



Furring Out on Brick or Concrete
Use the Standard

RUTTY METAL WALL PLUG

Send for Cement Booklet No. 94

J. B. Prescott & Son, Mfrs.

Dept. C

Agencies All Cities.

Webster, Mass.

PORTLAND CEMENTS

HAVE THEIR EFFICIENCY INCREASED
BY THE USE OF

HYDROLITE

TEAR OUT THE
COUPON

and send today for our FREE BOOKLET
telling, with reference proofs, how we guar-
antee that it

- (1) Increases Colloidal Yield.
- (2) Increases Tensile and Crushing Resistances.
- (3) Increases the Density of Concrete and Mortar.
- (4) Decreases voids and porosities.
- (5) Decreases action of free lime.
- (6) Decreases tendencies of Portlands to crack.
- (7) Decreases cost of mixing for

WATERPROOFING

GOOD PRODUCTS CO.

1705 Austin Avenue,
CHICAGO.

GOOD PRODUCTS CO.,

1705 Austin Ave.,
CHICAGO, ILL.

Gentlemen:—You may tell me something more about your
HYDROLITHIC SYSTEM, without obligation on my part.

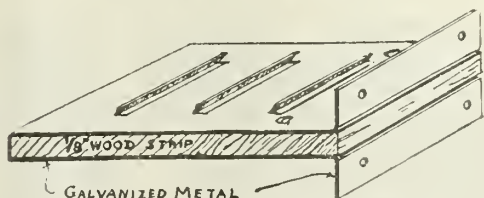
Name

St. and No.

City and State Business

It's Time You Us- ed Common Sense

Wall Plugs



"The Common Sense Wall Plug"

"Smile the Smile of Satisfaction"

Very Low Cost

Sample Free

The M. O. Wicks Mfg. Co.

48 Nassau Ave.

Glen Cove, N. Y.



Trade Mark
Reg. U. S. Pat. Off.

Protect Your Concrete With Bay State Brick and Cement Coating

It is being specified by the leading architects and contractors not only as a coating on cement, stucco, and brick surfaces to protect them against moisture, but on high grade interior work on both wood and plaster.

When you need a coating for cement and want something that will stand up and give protection and durability, also a pleasing finish, use the BAY STATE BRICK AND CEMENT COATING, which is the result of research and experimental work for concrete, wood or plaster, it stands up better than any other.

You know how necessary it is to protect concrete surfaces against dampness. My coating is damp-proof and gives a pleasing appearance without destroying the texture of concrete and in addition is a fire retarder.

Write for particulars about BAY STATE BRICK AND CEMENT COATING. Address for booklet No. 12.

Wadsworth, Howland & Co., Inc.,

Paint and Varnish Makers and Lead Corroders
82-84 Washington Street Boston, Mass.

WAINWRIGHT GALVANIZED STEEL CORNER BAR

FOR PROTECTING EDGES OF CONCRETE CURBS, STEPS, COLUMNS, ETC.

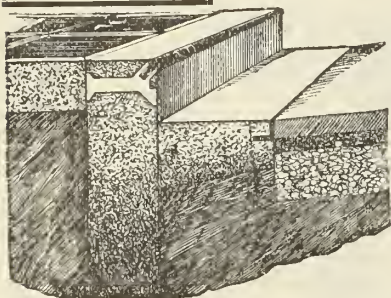
"Wainwright
Patents."

March 9, 1897
Nov. 22, 1898
May 5, 1903
March 26, 1907
August 29, 1907
August 2, 1910

THE BAR WITH A FOURTEEN YEAR RECORD

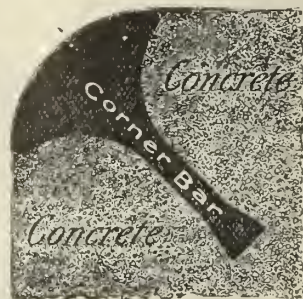
THIS BAR IS SELF-ANCHORING, THE DOVETAILED WEB HOLDING IT FIRM IN PLACE EVERY INCH OF ITS LENGTH, PRESENTING A RESISTING DEPTH OF TWO INCHES OF SOLID STEEL, AT EVERY POSSIBLE POINT OF IMPACT.

This bar has been in public use for more than fourteen years as the main feature of the



WAINWRIGHT STEEL-BOUND CONCRETE CURB

ABSOLUTELY NON-BREAKABLE
CHEAPER THAN GRANITE



GALVANIZED STEEL CORNER BAR prevents Chipping or Breaking on Edges.

MECHANICALLY PERFECT AND UNEQUALLED FOR CURVED CORNERS.

OVER FOUR MILLION FEET IN USE IN MORE THAN FOUR HUNDRED CITIES IN THE UNITED STATES

THIS CURB WILL STAND HARDER USE AND LAST TEN TIMES AS LONG AS PLAIN CONCRETE CURBING

CONTRACTORS can make money by laying this curb. CITY ENGINEERS can save money by specifying it. ARCHITECTS are invited to read pages 238 and 239 "Sweet's Index."

METAL PARTS FOR SALE. SEND FOR COPYRIGHTED BOOKLET NO. 2.

STEEL PROTECTED CONCRETE CO., Real Estate Trust Bldg. PHILADELPHIA, PA.

Vaughan's Patent Concrete Spade

A Tool for Finishing Concrete Walls

**IT PAYS FOR ITSELF
IN A DAY'S WORK.**

By use of Vaughan's Patent Concrete Spade, you can force the coarse aggregates in the concrete back, while the forms are still about the wall, and let the finer cement mortar flow forward, the perforations in the spade allowing it to come to the front. Your wall is thus given a smooth finish, without applying face mortars.

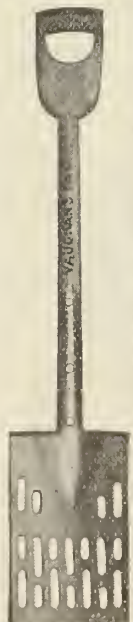
Manufactured only by

J. H. CLARK

Manufacturer of and
Dealer in

CONTRACTORS TOOLS
AND SUPPLIES

137-139 W. Lake St., Chicago



The "Kent" Precision Mixer

It is a well built concrete mixing machine, built on scientific principles. It measures and proportions materials accurately and delivers mixed concrete at lowest cost. Get our mixer catalog. Ask about the "Kent" Mortar Mixer.



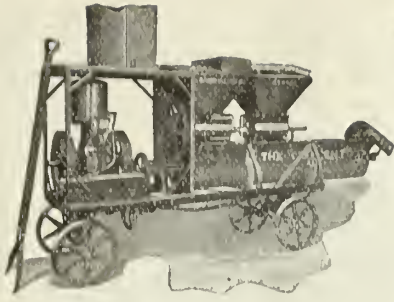
Address our ho
representatives

olk wing

Kent Machine Co.

310 N. Water St. Kent, Ohio

J. F. Davis & Co., Kansas City, Mo.
Dodge & Dodge, 1133 Broadway, New York.
M. G. Dennison & Co., 144 Cutler Bldg., Rochester
Wm. Pattison Supply Co., Cleveland, O.
Sanford Concrete Machinery Co., Toledo, O. The W.
E. Austin Co., 2 Spring St., Atlanta, Ga. New Orleans,
Houston, Dallas, Oklahoma City, Memphis, Roanoke and
Norfolk. The Beebe Co., Portland, Oregon.



Showing Mixer With Stone Hopper

How Your Neighbor Makes Money

YOU profit by the experience of others, or, in other words, we profit by the experience of *each other*. For instance—if John Jones is putting money in the bank by making cement tile and brick, don't you stand the same chance? And if Sam Brown is cleaning up a bunch of money by using an up-to-the-minute mixer, what's keeping you from doing the same thing? Take an inventory of yourself, and then let us tell you how John Jones and Sam Brown are doing it with

"Crescent" Continuous Concrete Mixers—The simplest, strongest, most practical and handy mixers on the market. Proportions wet and dry materials accurately, and mixes thoroughly. The price is low. Every cement worker should have one. We guarantee it.

"Crescent" Sewer Pipe and Tile Molds—Used the world over, and by Uncle Sam in his reclamation work. All sizes 4" to 48". Bell-up or bell-down on same mold, with or without pallets. We employ over 500 patterns in making pipe and tile molds alone. We can explain every "in and out" of this business.

"Crescent" Vertical Tamping Brick Machines—The only practical and scientifically correct machine on the market. Our 1912 model has a big feature that revolutionizes brick machines—the combined hopper, stripper and finisher, combined and patent facing plate. You will want it if you see it.

"Crescent" Power Tile Machines—To make tile 3" to 10". The price is very low. This machine alone is a big profit producer. Can be operated by one man. Utmost strength. Exclusive features.



"Crescent" Sewer Pipe Mold

SEND THIS NOW

Raber & Lang Mfg. Co.
802 Mill St. Kendallville, Ind.

Fill Out and Send to Us

Raber & Lang Mfg. Co.,
Kendallville, Ind.,

Please send prices and free literature on the following:

☐ Mixers ☐ Tile Molds ☐ Brick Machine ☐ Power Tile Machine

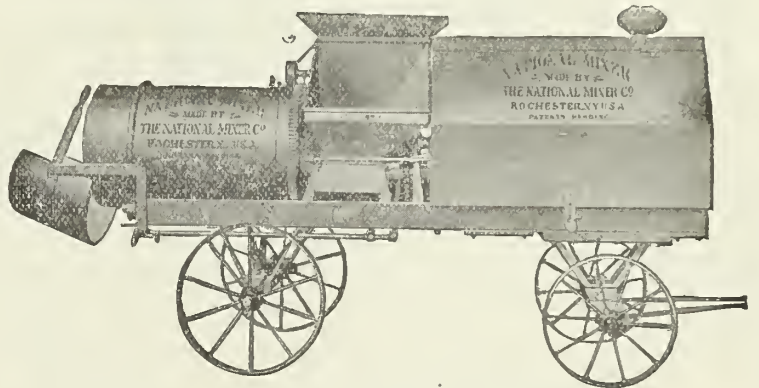
Name
Address

Mr. Contractor,
Everywhere

Dear Sir:

Start the season right. Buy a National Mixer. Use good materials, and your work will be a credit to your ability and judgement.

Yours for business,
NATIONAL MIXER CO.,
641 Mercantile Bldg.,
Rochester, N. Y.



—HESS MEDICINE SANITARY LOCKER—

The Only Modern, Sanitary STEEL Medicine Cabinet

or locker, finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimmings. Steel or glass shelves.

Costs Less Than Wood

Never warps, shrinks, nor swells. Dust and vermin proof, easily cleaned.

Should Be in Every Bath Room

The Recessed Steel Medicine Cabinet

For styles—four sizes. To recess in wall or to hang outside. Send for illustrated circular.

HESS, 902L Tacoma Bldg. CHICAGO

Makers of Steel Furnaces.

Free Booklet.

The Outside Steel Cabinet



Men pooh, pooh, sometimes, at "Book Learning." A man's own experience certainly is the best teacher. But a man's own experience doesn't contain enough to be all-sufficient. He must know what experience other men have had. The knowledge of other men's experiences is to be found in books. Practically every book of value to the concrete worker is listed in a catalog which will be sent to you by the **CONCRETE PUBLISHING COMPANY**, 97 Fort Street West, Detroit, Michigan, merely for the asking.

"LIQUID KONKERIT"

PATENTED

☐ A cement paint for use on exterior walls of brick, stone, stucco, concrete and wood. A most wonderful protective coating made in all shades, giving a finished appearance of cement, also used on freshly plastered walls. Can be painted over with oil-paint or enamel.

☐ Correspondence welcome.

TOCH BROTHERS

Manufacturers of Technical Paints, Enamels, Varnishes and Dampproofing Compounds.

320 Fifth Avenue, New York, N. Y.

Works and Laboratories: Long Island City, New York.

For Securing Wood Forms

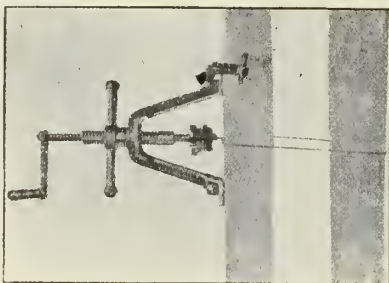
Milwaukee Wire Tightener and Twister.

Why use cumbersome clamps or drive your lumber full of spikes? Hold your forms in place by wire on the outside. Tighten it—fasten it in place—with our Wire Tightener. When concrete is set, cut the wire and your timber is good as new.

This tool will pay for itself on the first job. Ask for circular and prices.

The Milwaukee Device Company

1287 National Ave., Milwaukee, Wis.



Peerless Concrete Moulds

for Monolithic Silos.

Houses, Barns, etc.; the most simple, practical, complete on the market, and the Contractor's largest profit maker. We are Contractors as well as Manufacturers, and our experience, seven years, proves these statements.

SILO, or CIRCULAR Moulds built in standard size for diameters of 12', 14', 16' and up, or FLEXIBLE Moulds, each building three different diameters.

STRAIGHT WALL Moulds 24" deep, any desired lengths.

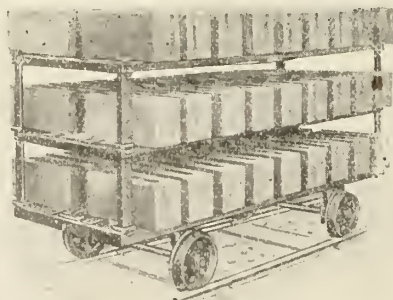
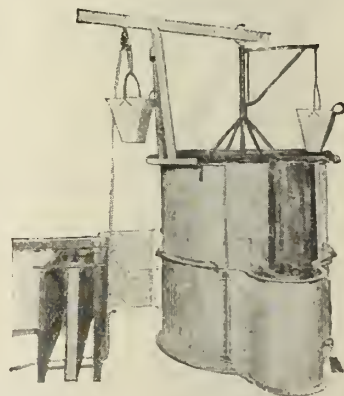
WE are the EXCLUSIVE owners of all U. S. Letters Patent, issued or applied for, on our moulds, and we caution all persons, firms or corporations from manufacturing, selling, using or purchasing them without our authority, or in any way contributing toward the infringement of our rights under said patents.

If you are in the market for concrete moulds, write US. If your Contractor does not use Peerless Moulds, let US build for you.

Live Agents or Organizers Wanted in Every State.

New Enterprise Concrete Machinery Company

154 W. Randolph St., Chicago, Ill.



CHASE CARS

for handling Block, Brick, Tile, Sand, Gravel, Stone, etc.

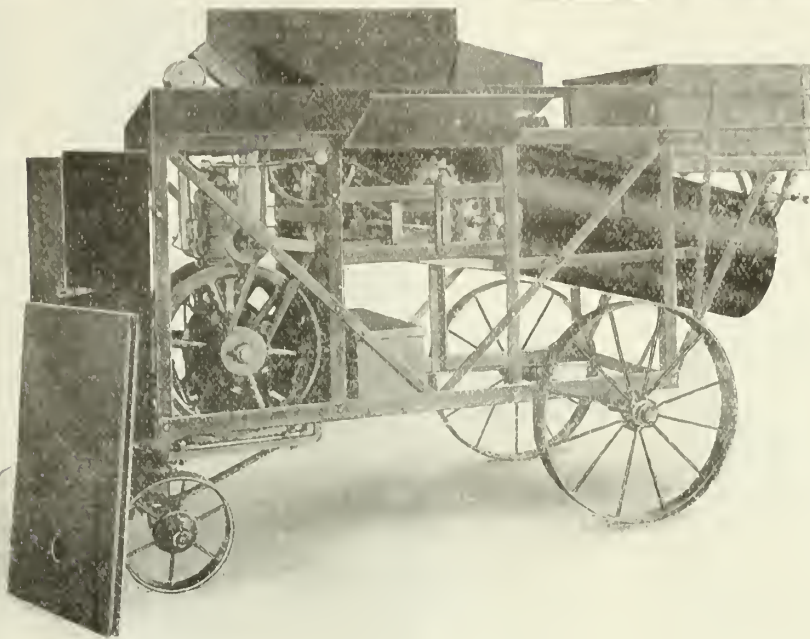
WE MANUFACTURE A COMPLETE LINE

of cars for all purposes, in the plant or on the construction job. Write for Catalog.

The Chase Foundry & Mfg. Co.

Columbus, O.

Little Giant Concrete Mixer

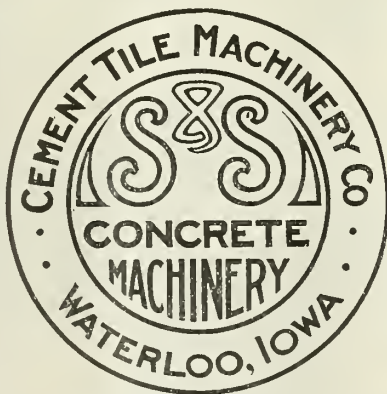


Our power models, B2 or B3, undoubtedly possess the greatest adaptability of any mixer on the American market today. Either model can be readily adjusted to regulate the output from 3 cubic yards per hour to 10 cubic yards per hour, by simply adjusting the gates regulating the feed. A great many contractors have told us, in the last few weeks, how well pleased they were with their LITTLE GIANT mixers. Some of these men have been using the mixer for years, and have found that their mixer turns out a perfect concrete with a minimum expense for operation, and with practically no charge for upkeep.

FREE TRIAL OFFER

We offer to demonstrate the value of this machine in your own hands, on your own work, without it costing you a cent. Ask for our proposition.

Ballou Manufacturing Company, 104 High St., Belding, Mich.



WHEN YOU NEED

Tile Machinery
Concrete Mixers
Block Machines
Brick Machines
Post Machines
Tile Molds
Wheel Barrows

Sand Screens
Sand Elevators
Stone Crushers
Steam Shovels
Gasoline Engines
Dump Wagons
Ornamental Molds

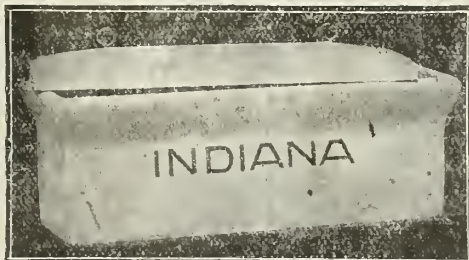
Industrial Cars
Steam Boilers
Friction Hoists
Sand Washers
Cement Tools
Side Walk Forms
Culvert Forms

Write us for literature and prices for we are sure that the S. & S. Line will please you. We make a specialty of equipping concrete product plants complete and can furnish you with anything from a short handled shovel to the complete plant.

The Cement Tile Machinery Company

985-90 Rath Street

WATERLOO, IOWA



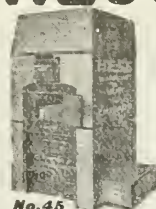
We sell
**Burial
Vault
Molds**

NO TERRITORIAL RIGHTS OR ROYALTY.
Satisfied Customers' Testimony.

"We have been using your Mold for months, and are entirely satisfied."
"We are getting good results with your Mold, and are much pleased." Write us for circulars.

INDIANA CONCRETE BURIAL VAULT CO.
780 Lemcke Bldg., Indianapolis, Ind.

HESS FURNACE



No. 45
"Lander" Hess
Steel Furnace
Price \$49.00
Delivered East of Omaha and
North of Ohio River
Pipes and Registers Extra

We will deliver a complete heating equipment at your station at factory prices and wait for our pay while you test it during 60 days of winter weather.

The entire outfit must satisfy you or you pay nothing. Isn't this worth looking into? Could we offer such liberal terms if we didn't know that the Hess Furnace excels in service, simplicity, efficiency, economy.

We are makers—not dealers—and will save you all middlemen's profits. No room for more details here. Write today for free 48-page booklet which tells all about it. Your name and address on a post card is sufficient.

HESS, 902 Tacoma Bldg., Chicago

Makers of Hess Sanitary Steel Lockers or Medicine Cabinets for Bath Rooms. Illustrated circular free.

Thousands of money-making concrete products manufacturers maintain that the

Peerless Brick Machine

Has No Equal

The Peerless is made of high grade carbon steel and heavy malleable iron; it can't spring out of alignment as will sheet steel and angle iron, and will outlive its owner.

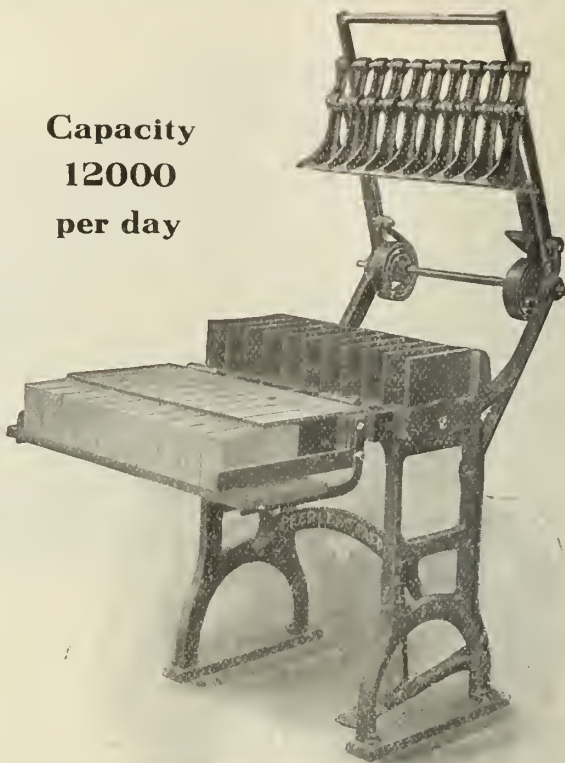
We guarantee its construction in the following unparalleled guarantee: If machine is broken or injured in operation we will replace any broken or injured part free of charge as long as machine is in the hands of the original purchaser. Will others do this?

Cement is at the lowest price ever known. Buy the machine that will make money for you. Write for catalogue and booklet on cement brick.

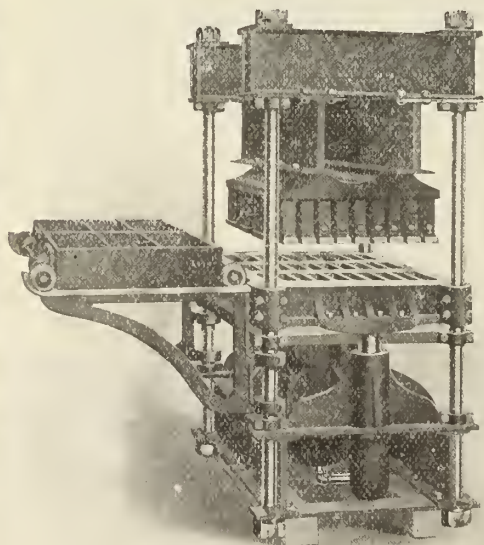
Peerless Brick Machine Co.

9 North Sixth St., Minneapolis, Minn.

Capacity
12000
per day



Buckeye Hydraulic CEMENT BRICK MACHINE



The only successful power press on the market. Makes 15,000 brick per day, under pressure of 200,000 pounds. We install complete plants. We also manufacture Mortar Mixers, Concrete Mixers and Gasoline Engines.

Write us for prices and particulars.

Buckeye Engine & Foundry Company

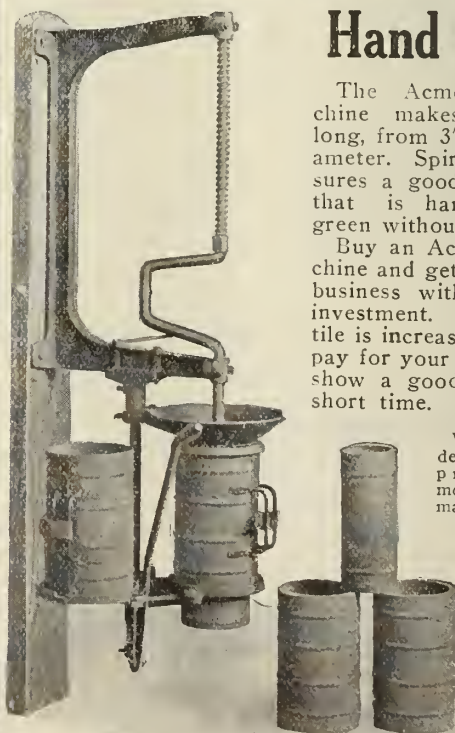
Joliet, Ill.

Tile Machine Hand Power

The Acme Tile Machine makes tile 12 1/4" long, from 3" to 8" in diameter. Spiral packer insures a good, strong tile that is handled while green without breakage.

Buy an Acme Tile Machine and get into the tile business with very little investment. Demand for tile is increasing. You can pay for your machine and show a good profit in a short time.

Write for folder describing and pricing this money-making machine.



**Acme
Tile
Machine
Co.**

LaGrange,
Ind.

Capacity 1,000 Tile per Day.

ANTI-STICK PRODUCTS DID IT

OTHERS HAVE BEEN WISE. WHY NOT YOU THIS TIME?

Anti-Stick is applied to forms of all kinds, where the poured process is used, and releases from the concrete every time. No oils or grease to smear your forms. Prevents steel forms from rusting. Makes possible a smooth onion skin finish to concrete.

Anti-Stick Enamel—A coating for forms where the damp process is used, and where the forms are removed immediately.

Anti-Damp—"The Old Reliable" liquid damp proofing. Once there it is there to stay. In colors.

JUST SAMPLES FROM HUNDREDS

CLEVELAND, AKRON & CINCINNATI RAILWAY CO.

Millersburg, Ohio, March 13th, 1912.

The Anti-Stick Company, Westerville, Ohio.

Dear Sirs:—Today we are making requisitions for Anti-Stick, Anti-Damp and Anti-Stick Enamel, as we will start making fence and information posts in a few weeks.

We hope the requisition goes through and that you may be able to ship promptly, as we would dread starting this work without the Anti-Stick and Anti-Stick Enamel for our forms.

We desire to paint all information posts with Anti-Damp before shipping them out, as those painted with the Anti-Damp last year are in fine condition.

We certainly get an egg-shell finish to the posts when we use Anti-Stick. Yours truly, H. L. CLARK, Master Carpenter.

WILLIAM JEFFER, Manufacturer of
WATERPROOF CONCRETE BUILDING MATERIAL.

Ridgewood, N. J., April 1, 1911

The Anti-Stick Company, Westerville, Ohio.

Dear Sirs:—

Please send me six gallons of Anti-Damp imitation brown stone coloring the same as I previously had, for I am well satisfied with it, as it works just as you stated, keeps you dry, colors fast, is very hard, and above all it is easily applied.

Shipment: 5 gallons by freight and 1 gallon by express.

Please send at once and I wish you would send me some samples at once. Yours truly, WM. JEFFER.

THE UNITED STATES MAUSOLEUM COMPANY—Incorporated.

Public and Private Sanitary Mausoleums.

OFFICERS—W. P. Vrooman, President; C. S. Beelman, Vice. Pres.; E. B. Smith, Treas.; V. Ernsberger, Secretary.

The Anti-Stick Company, Westerville, Ohio.

Fremont, Ohio, July 27, 1911.

Gentlemen:—Please ship us at your earliest convenience 10 gals. of Anti-Stick.

We are about to erect a Mausoleum in this city and also at Sandusky, and as we have previously advised you, we do not furnish this material ourselves, as our work is done through sub-companies. We wish, however, to use the above order to demonstrate in a number of places. We expect, however, to place some good size orders with you for our work in various cities, including Milwaukee and a number of other towns in the state of Wisconsin, Butler, Pa., in fact we have more than a dozen buildings that will start in a few days. These buildings, or portions of these buildings, are made with molds requiring your Anti-Stick. Our last test of your material proved quite satisfactory and I believe it will be of mutual benefit in the near future.

Hoping to receive a prompt shipment, as we are entirely out of material and wish to use it at once in our Fremont & Sandusky construction, we remain.

Write us regarding our concrete floor finish.

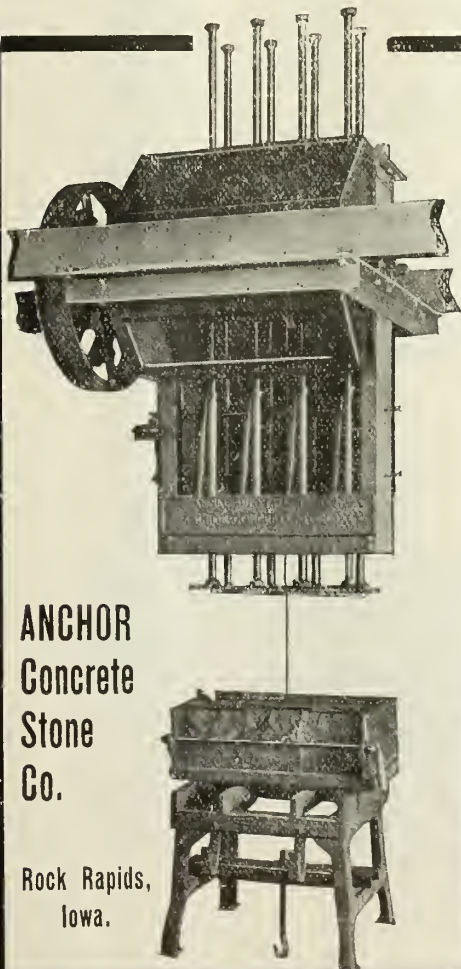
Our products are used in all classes of concrete work.

Users the best boosters of Anti-Stick Products.

We shall be awaiting your patronage.

Yours truly,
THE UNITED STATES MAUSOLEUM COMPANY.

Anti-Stick Co., Westerville, Ohio



**ANCHOR
Concrete
Stone
Co.**

Rock Rapids,
Iowa.

ANCHOR AUTOMATIC TAMPER

Runs silently—Strikes 600 blows per minute.

Instead of having one or two men bending their backs over your block machine, getting tired as the day grows older, getting out a few blocks of varying density, why not have an Anchor Automatic Tamper, requiring no floor space, suspended over your machine, with eight tampers, each striking 75 blows per minute, 600 lbs. each?

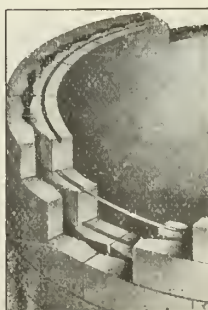
With this tamper you increase your output, improve its quality and cut down the cost per block. The tamper is noiseless—runs like a watch. Fits any block machine. Get our Special Tamper Circular.

ANCHOR BLOCK MACHINE

Makes blocks for two piece wall construction—each block is in two pieces, tied together with wire ties. These blocks sell themselves, because the buyer can see for himself that they're bound to make a dry wall. Masons like to lay them.

ANCHOR SILO BLOCKS

Silo blocks like the ones shown in the silo wall below are in demand everywhere—they may be made on the Anchor Block Machine equipped with Silo Mold Attachment. Note the complete air space in the silo wall. Write for Anchor Block Machine catalog describing the regular block machine and the silo block attachment.



It is easy to lay
Anchor Blocks



GETTING THE JOB RIGHT



RIGHT there is where the economy comes in,—in concrete work. We claim—and rightly so,—that concrete is the last word in fireproof, economical, permanent construction. And yet, unless the materials used are **right**, our claims are not valid. The heart of good concrete is the cement. Its life depends largely on the cement.

Dependability

is just what we claim for Atlas Portland Cement,—always uniform,—the indisputable standard of quality. If you want to get the job right, you will do just what the U. S. Government did on the Panama Canal,—use exclusively

ATLAS PORTLAND CEMENT

"The Standard by Which All Other Makes are Measured."

ATLAS-WHITE
A true Portland Cement, white in color and absolutely non-staining.



THE ATLAS PORTLAND CEMENT CO.

30 Broad Street, New York.

Morris Bldg., Philadelphia, Pa.
Corn Exch. Bank Bldg., Chicago, Ill.

Largest output of any cement company in the world.

The Period of Mixing

IS AUTOMATICALLY TIMED

Every particle of cement, sand and stone is mixed the same length of time before it can be discharged. The mixing compartment of the Eureka is the longest used on any mixer. The special plow-shaped blades cut through the materials from the bottom, lift and pour them over and through each other. This process of

EUREKA

shoveling, pouring and cutting through continues until the materials have passed at least forty mixing operations and are delivered a better and more uniform quality of concrete than is ever obtained from any other mixer in actual practice.

A Dry Mix Before Water and Stone are Added

All experienced concrete men agree that if you thoroughly mix cement, sand or gravel dry you have the fundamental requirement of a high quality of concrete. This is precisely what the Eureka does. It thoroughly mixes dry before the stone and water are added. This dry mixing is done in a part of the mixing compartment that water never reaches. Hence the cement does not ball, but is completely blended with the sand, without delay in the process. After this follows a thoroughly wet mix of the whole mass. In using barrows or carts a batch can be drawn. The Eureka is built in sizes from 5 to 35 cubic yards an hour.

Over 250 Eurekas used in New York City.

LETTER FROM CITY OF DETROIT

CITY OF DETROIT, MICHIGAN
DEPARTMENT OF PUBLIC WORKS

J. J. HAARER, Commissioner.
Porter Murphy, Secretary.

Wednesday,
December Twentieth,
Nineteen Hundred Eleven.

Eureka Machine Company,
Lansing,
Michigan.

Gentlemen:—It gives me considerable pleasure in stating that this department purchased from you last July two (2) of your concrete mixing machines, which have been constantly used since that time and they have been giving satisfaction in such a manner that I have this day recommended to the Commissioner of this department the advisability of putting on more of your machines.

One of the real pleasures of operating your mixer is due to the fact that the numerous petty annoyances connected with other machines we have experimented with have been entirely eliminated. No repairs or break-downs that hold up the work for an hour or a day were met with.

The mixer does all that your representative claimed and then some. I am proud of the mix that we have obtained this season through the use of your machine and stand ready to recommend its use to any one who is in need of a machine that will stand up and do the work in a rapid and an efficient manner.

Yours respectfully,

ARTHUR F. LAYTON,
Superintendent.

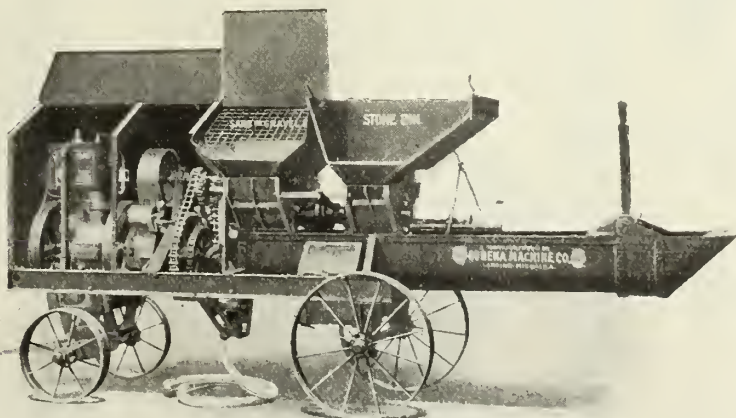
Ask for new Catalog No. 16—
Just out.

All Eureka mixers are completely standardized. The mixer shown in cut is built in all sizes from 5 to 35 cubic yards an hour.

General Eastern Agents
W. V. JOHNSON & CO.
1 Madison Ave., New York

**EUREKA
MACHINE
COMPANY**

60 Handy St., Lansing Mich.



THE KOEHRING

3 In 1 Principle of Mixing Means Three Times as Much Mixing

Three times as much mixing in a given time or an equal amount of mixing in one-third of the time.

It is all due to the fact that there are three independent and opposed continuous mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

There is a cutting through at the bottom and lifting and pouring of material from the side and end-to-end mixing, breaking the material over against the heavy cast drum heads and a cataract flow off the inner end of the discharge chute, producing a thoroughness of mixing, a rapidity of mixing and a uniformity of mixing no other machine equals.

There are almost equally important advantages in the mechanical construction of the Koehring Mixer.

The heavy cast special metal Koehring drum will outlast the drum of any other mixer.

The trunion rollers are keyed onto the axles and rotate as a unit precisely in the same manner as a railroad truck, making impossible "wobbly" drums and rollers.

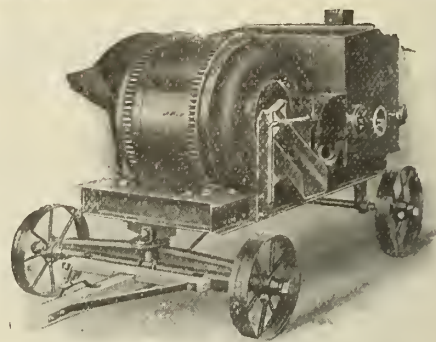
The charging bucket raises to nearly vertical position, enabling all material to pass into drum without pounding the bucket.

Why not write for our catalogue?

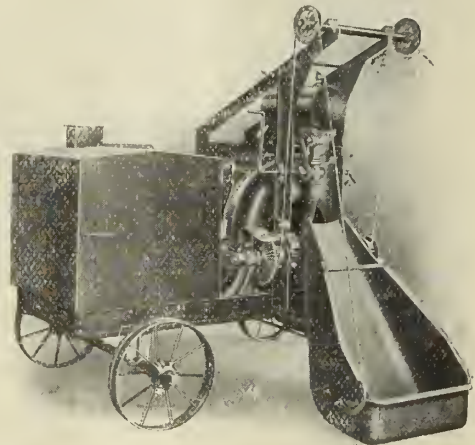
KOEHRING MACHINE CO., Milwaukee, Wis.

KOEHRING MIXER AGENCIES

Baltimore, Md.—Thomas M. Brown, 32 Knickerbocker Bldg.
 Birmingham, Ala.—J. F. Donahoo Co., 8th Floor Woodward Bldg.
 Boston, Mass.—P. O. Johnson 70 Kilby Street
 Butte, Mont.—Montana Lime & Flux Co., 501 W. Galena.
 Charleston, S. C.—Carolina Portland Cement Co.
 Chicago, Ill.—Koehring Machine Co., 857 Peoples Gas Bldg.
 Columbus, Ohio—Williams Contractors Supply Co., 8th Floor Brunson Bldg.
 Dallas, Texas—Wm. T. Fulton Co., 2035 Commerce St.
 Denver, Colo.—H. S. Hitchman Co., 411 Nassau Bldg.
 Detroit, Mich.—Good Roads Supply Co., 1408 Ford Bldg.
 El Paso, Texas—Wm. Jennings Co., 411 Roberts-Banner Bldg.
 Grand Rapids, Mich.—A. B. Zierlyn & Co., 324 Houseman Bldg.
 Greensboro, N. C.—E. F. Craven, 427 S. Daire St.
 Kansas City, Mo.—Koebring Machine Co., 808 Victor Bldg.
 Los Angeles, Cal.—California Machinery & Equipment Co., 630 Higgins Bldg.
 Louisville, Ky.—Chandler-Burgoyne Co., 42 Todd Bldg.
 Memphis, Tenn.—P. H. Linz, 44 Byrd Bldg.
 Minneapolis, Minn.—D. F. Bowler Equipment Co., 208 Palace Bldg.
 Newark, N. J.—Abbey-Brooks Co., 514 Essex Bldg.
 New Orleans, La.—Wm. E. Joor, 802 Perrin Bldg.
 Philadelphia, Pa.—Lee T. Ward Co., 688 Bourse Bldg.
 Pittsburgh, Pa.—Carlin Machinery & Supply Co., Sandusky and Lacoek Sts.
 Rochester, N. Y.—H. B. Trevor Co., 144 Cutler Bldg.
 Salt Lake City, Utah—Harris Bros., 310 Atlas Bldg.
 San Francisco, Cal.—Hicks, Nell & Marks, 604 Mission St.
 San Antonio, Texas—Alamo Iron Works.
 Seattle, Wash.—Moran Engineering Co., 1246 First Ave. So.
 St. Louis, Mo.—C. E. Robideaux, 1510 Chemical Bldg.
 Toronto, Ont.—Canada Foundry Co., Ltd.



Equipped with Standard Hopper Showing House over Gasoline Engine.



Charging Side View Equipped with Side Loader, Water Tank and Gasoline Engine.

25% Saved in Time 25% and Labor

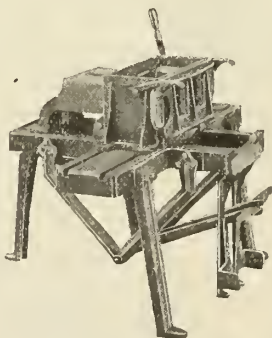
This little cut represents a large, perfect, fast-operating block machine that will enable you to add a handsome sum to your regular profit each day, if you will let it take the place of the machine you are now operating.

The **World Beater** makes any size, style and design of block up to 24" long and 12" thick. It is positively adjusted and turns out a product faultless in shape, true to dimensions and without a crack, because all parts are accurately machined and because of the improved method of loosening block from cores and mold. Solid, cored and veneered blocks of all shapes and sizes made on the same machine simply by adjusting mold.

If a better block and 25 per cent more of them is of any account to you in your business, let us send you one of these machines on ten days' trial.

U. S. Gas Machine Co., Muskegon, Mich

25% Saved 25%



THE WORLD BEATER

The machine that will positively save you 25% in time and labor.

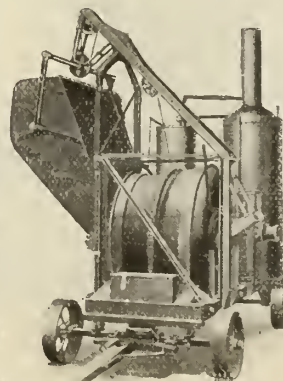
Deeds, Not Words!

Mr. Contractor:—Don't take our word for it, that we have the best **CONCRETE MIXER** on the market, but ask any contractor who has used, or is using the

CHAIN BELT MIXER

just what he thinks of it.

IN MILWAUKEE there were about twenty concrete mixers sold in 1911, and fourteen were **Chain Belts**. Six of the leading concrete mixer concerns have their plants in Milwaukee. Draw your own conclusions Mr. Contractor.



"The Mixer with THE BULGE"

Where there is big construction work you will generally find a **Chain Belt Mixer** on the job. You owe it to yourself to investigate the **Chain Belt** before placing your order.

We also make elevators and gravity distributing systems. Send today for **CATALOG NO. 42**.

Chain Belt Co.

MILWAUKEE, WIS.

OLD COLONY BLDG., CHICAGO

MANUFACTURERS OF CONVEYING, ELEVATING & CONCRETE MACHINERY

ESTABLISHED 1882



THE HARTWICK

The Two-Trough Mixer

GARNER BROS. CO.,
General Contractors,

Detroit, Mich., Jan. 29, 1912.

Hall-Holmes Manufacturing Company,
Jackson, Mich.

Gentlemen:—

We have been using the Hartwick Concrete Mixer for the past four years with the greatest satisfaction.

Before we purchased a concrete mixer, we had at least six different makes on trial and after giving each one a thorough test, we decided to buy the Hartwick, it having given us the best result.

We think that the Hartwick Concrete Mixer is the very best on the market and would not hesitate a moment in recommending it to anyone contemplating the purchase of a mixer.

Very truly yours,
GARNER BROS. COMPANY.

The "Hartwick" has a double mixing trough, increasing capacity and improving the mixture. We also manufacture the "Grand" Continuous Mixers. Before you buy a mixer, get our catalogs.

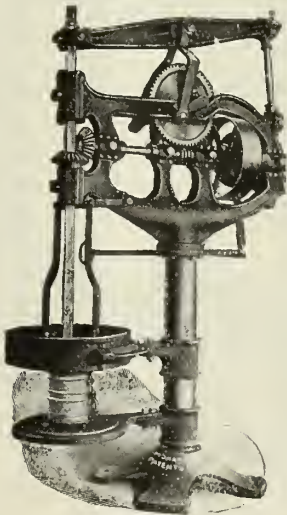
Hall-Holmes Mfg. Co.
230 Oak St. JACKSON, MICH.

CONCRETE Will Pay \$25

for the best description
of a Steam Curing Plant

CONCRETE will pay \$25 for the best description of a steam curing plant in a concrete products factory. The fact that your plant is small or large makes no difference whatever. The \$25 will not be given to the man who describes the largest plant, the best equipped plant or necessarily the best plant. The award will be given for *the best description*. It is obvious that a curing plant ever so large or ever so efficient would afford no special inspiration to readers of CONCRETE if the description omitted essential details. Details are wanted. The description probably should include a sketch or two, but not necessarily. The award will be given to the man who gives the most practical details in connection with a steam curing plant. The description should be understandable to a man who has never seen a steam curing plant. What you include in the description is left to you. It may include a drawing, photographs, cost figures, test records, car and track equipment, wall, roof and door construction, piping and the system of supplying and using the steam, the kind of steam, temperature of kiln, duration of curing, comparisons of results of different conditions and arrangement of kiln with relation to factory. Your description should be mailed not later than June 10. The editors of CONCRETE reserve the right to retain all material submitted. For each description published aside from the one for which \$25 will be paid a subscription credit will be given. CONCRETE reserves the right to extend the time of contest or withhold prizes altogether if the material submitted is not of as much value as we have a right to expect from our readers among the concrete products manufacturers. Do not wait until June 10. Write the description this evening.

When You Hire a Man



Monarch Co. 1

you select one you know is best adapted for your work, and who will make you the most money. We ask you to buy the

MONARCH TILE and BLOCK MACHINE

on the same basis—its earning capacity. A strictly modern machine, built for service; every feature designed to save time.

We have recently made some exceptionally valuable improvements in Jacket Fronts, Packer Heads and Pallets.

Ask about our Improved Jackets.
Full Line Cement Working Machines.

MONARCH MANFG. CORPORATION

777 Cedar St., Onawa, Iowa, U. S. A.

Address

The Editors of CONCRETE

Detroit, Michigan

Liner Advertisements

Notes for these columns: Three cents per word per insertion, payable in advance. Copy can be accepted as late as the First of any month for that issue.

WANTED--Machinery

WANTED--SECOND HAND 9" INSIDE diameter Multiplex Chimney Flue Machine with pallet Thinble Register forms. Address Box 117, Harvey, Ill.

WANTED - SECOND-HAND BATCH Mixer for Sidewalk work; must be on truck; with or without engine. E. L. Lutz, Princeton, Ill.

WANTED--SALESMAN FOR MATERIALS for re-inforcing concrete, including Sidewalk Lights, Expanded Metal Lath, etc. Applicant must be experienced. The Berger Mfg. Co., Canton, Ohio.

WANT TO BUY SECOND-HAND POWER tile machine. Roy Terry, Box 325, Lincoln, Ill.

FOR SALE--Machinery

FOR SALE - CHEAP IF SOLD AT once, Miracle double staggered air space concrete block machine, complete and perfect. W. K. Annis, Orleans, Vermont.

FOR SALE - CHEAP IF TAKEN AT once, 1 tilting Mixer, semi-open drum, with power loader, steam engine and boiler, mounted on trucks suitable for all large contracting work. Never used.

1 Continuous Proportioning Concrete Mixer, standard make, low feed, high delivery, capacity 60 cu. yds. Used only for demonstrating purposes.

1 Block Machine, 8x12x24". Makes blocks face down. Never used. Best make on market.

1 Snell Batch Mixer. Capacity 7 cu. ft. per batch. Never used.

1 Mixer for facing materials. Can be operated by hand or power.

For full particulars address Box No. 122, c/o Concrete Pub. Co., Detroit, Mich.

FOR SALE CHEAP - 1 60-YARD Scheffler Double Mixing Trough, Continuous Concrete Mixer on trucks, 3 H. P. Engine; also 1 80-yard Systematic Continuous Mixer on trucks with 2 H. P. International Engine; both machines in A No. 1 condition. 1 20-in. Dunn Combination Block Machine; 1 set of 12-in. Porch Column Molds complete. S. M. Goodwyn, Taylor, Texas.

FOR SALE OR EXCHANGE - POWER Continuous Mixer for 16" Tamper, Kramer or Anchor preferred. Russell Pirch, Box 216, Wheatley, Ont., Can.

CRUSHING PLANT TO LEASE--PLANT located in East for crushing materials for facing concrete for paths, poultry grit, etc., with machinery in perfect running order and material on hand to crush; to lease or sell. Address Room 66, No. 99 John St., New York City.

FOR SALE--CONCRETE BLOCK Machines, Shingle Machines, Mixers, Molds, Tools, etc. Write us for prices. The Jaeger Machine Co., Columbus, Ohio.

FOR SALE - GRANITE WEATHER-proofing Paint for Coloring and Waterproofing Concrete Blocks or Buildings. Write us for Color Card and prices. The Jaeger Machine Co., Columbus, Ohio.

DEXTER

Portland Cement
THE NEW STANDARD

Sole Agents **SAMUEL H. FRENCH & CO.** Philadelphia



MAKE A GOOD BLOCK MACHINE FOR about fifty cents. Illustrated directions, fifty cents. Have for sale the best brick and block machines cheap. William Barten, Gordon, Nebraska.

FOR SALE - WRITE WETTLAUER Bros., Buffalo, N. Y., for their Catalog with new plan of selling at bottom prices on Mixers and Brick Machines.

BLOCK MACHINES FOR BUILDING Double Wall Frost Proof Concrete Silos. Address, J. J. Coyne, Fond du Lac, Wis.

FOR SALE--LOCAL RIGHTS TO MAKE best waterproofing compound on the market. A. Chapple, P. O. Box 517, Tuscaloosa, Ala.

FOR SALE - ANCHOR BUILDING Block Machine; Adjustable Steel Culvert Core; cheap. Will trade for Concrete Mixer. Geo. K. Edwards, Granite City, Ill.

POSITIONS OPEN

WANTED FOR NEW ZEALAND, COMPETENT manager of works for a Portland Cement Company. Must have a thorough knowledge of cement manufacture in all its branches and be a capable organizer. For particulars apply to Messrs. R. W. Cameron & Co., 23 South William St., New York. Applications to be received up to the 22nd May.

SEVENTH EDITION.

CONCRETE SIDEWALKS

With Chapters on
Curbs,
Gutters,
Floors and
Pavements.

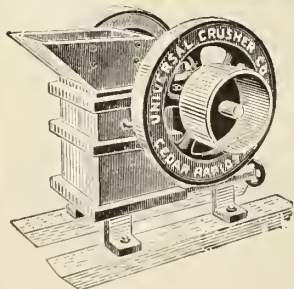
A Book of Practical Information
for the
General Concrete Contractor.

Price 35 Cents.

CONCRETE PUBLISHING
COMPANY

Detroit, Michigan.

Concrete of the most beautiful texture may be produced by using sand molds. You should have the book CONCRETE FROM SAND MOLDS, by A. A. Houghton. It is a volume of 135 pages, fully illustrated and with practical, instructive text. Cloth bound, price, postpaid, \$2.00. CONCRETE PUBLISHING COMPANY, Detroit, Michigan.



Try this UNIVERSAL Crusher in your plant for 30 days

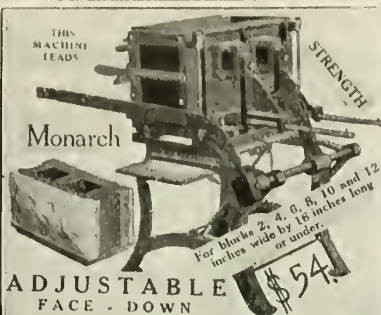
Our No. 2M has an opening $5\frac{1}{2}$ " x 12" when fitted for fine grinding, and 8" x 12" with the corrugated jaws for coarse crushing. It weighs 3000 lbs., takes 6 H. P. and will give from 20 to 50 tons in 10 hours, depending on how fine you want it.

This is certainly the machine for your Block or Tile plant, for your Gravel Pit, for handling the rejections in your Quarry, or for any place where uniform fine material is needed. Every machine is sold on a 30 days' trial to your heart's content—fair enough for any man. Send for our catalog.

UNIVERSAL CRUSHER COMPANY

33 B. Avenue
CEDAR RAPIDS, IOWA

Mr. Reader:--It will pay you to watch this page from month to month



Get catalog No. 8 for discounts. Our Systematic Mixer leads. See ad, page 109, this issue. **CEMENT MCHY. CO., Jackson, Mich.**

The Rapid Vase Molds



Complete a concrete lawn vase every 15 minutes, with only one man, at a cost of 8c to 22c each. Four styles and sizes. Write for folder No. C-28, describing Vase Molds, Hitching Posts, Pedestal and Baluster Molds that work "just like molding cement blocks". Do it today.

A. A. HOUGHTON, Northville, Mich.

SPRUNK Engraving Co.



Crushed Granite

Screened to size, for concrete or artificial stone. The strongest and most durable aggregate. Two colors, gray or white. Woodbury Gray Granite is mouse-gray in shade. Hardwick White Granite is the whitest granite known. In carlots, at a low price.

Let us quote you also on granite sills or trim for use with concrete work. Quick delivery.

WOODBURY GRANITE CO.,
Hardwick, Vermont.

Sanitoid Flooring

A Composition Mineral Substance laid in monolithic form and producing a fireproof, waterproof, permanent, and sanitary flooring base, or wainscot. Methods of installing SANITOID are simple and easily learned. Can be sold at good profits for a hundred different uses. Write for material costs and territory rights today.

The Sanitoid Products Co.

701 Brunson Bldg. COLUMBUS, O.

CHARLES E. SIMS Consulting Engineer
Worthington, Minnesota.

Cement drain tile factories designed. Detailed plans, specifications and cost for building and equipment. Proposed sites investigated.

Manufacturers and Contractors

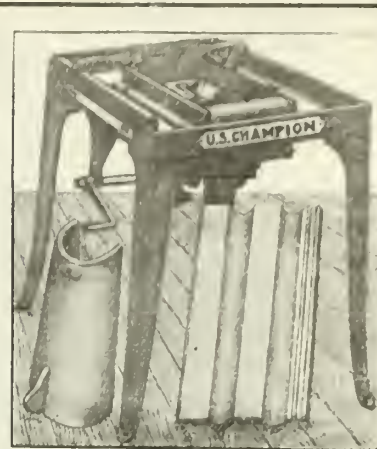
We can put you in touch with parties who are planning the erection of new brick, cement, concrete, tile plants, etc. Write us today and we will give you complete information.

United States Press Information Bureau
1309-153 LaSalle St Chicago, Ill.

Barten Process and Machine

For Making Concrete Building Blocks or a Slushy, Muddy Mix, also of a Moist mix. 1000 machines in one, and by far the lowest in price. Send for catalogue.

W. H. Barten, Gordon, Nebr.



This Cement Roofing Tile Machine (Pat'd 3-12-07)
Is the only practical machine of its kind on the market. For durability and attractiveness the U. S. Champion tile roof supercedes all others. It has no competition. Little investment. Big profit. Write for our new catalog. **L. Hansen & Co., 2036 Penn St., Kansas City, Mo.**

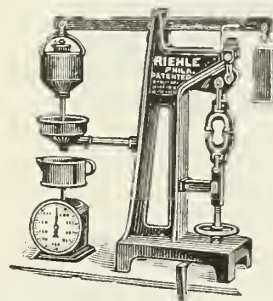
For Sale

Fifteen 30" gauge, 40 cu. ft. square box rocker bottom Koppel Steel Tunnel Cars. Twelve 30" gauge 27 cu. ft. Youngstown V-shape Concrete Cars.

No. 33 Chicago Improved Cube Mixers, Buckets, Crushers, Drills, Hoists, Pumps, Air Compressors, Cableways, Etc. Write

E. C. Sherwood

42 Church St., New York.



RIEHLE AUTOMATIC CEMENT TESTING MACHINE

Pat. Nov. 8, 1904.

Solid Back Grip

Pat. Sept. 11, 1900
Pat. June 10, 1904

Testing Outfit

1424 North 9th St., Philadelphia, Pa.

Mixers and Brick Machines

Write us for our catalog and new plan of selling mixers and brick machines at rock bottom prices.

Wettlaufer Bros.

Buffalo, N. Y.

Advertisers

To manufacturers of small specialties not profitably advertised in big space and manufacturers of heavy equipment who want to "feel out" this field we recommend the use of advertising space on this page. Advertising space here is given distinctive position, and will bring results. This rate is low because no large space is sold; you can keep your proposition before our readers the year 'round at little expense. No advertisement accepted to occupy more than 3 inches single column, on this page. Ask for rates.

My power brick machine will TAMP 60,000 brick every day—

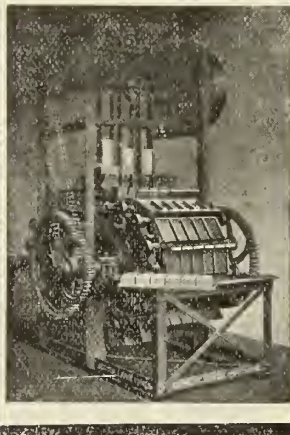
If I can write about the brick machine, I'll let the regular advertising man write the rest of this ad.

Now hasn't your idea of the cement brick business been that it's a sort of "sideline"? That's what it generally is. But I know that cement brick can be made so much better than clay brick—I refer to the common body brick—and so much cheaper, that a properly equipped cement brick plant will pay anywhere in this country.

My brick machine is shown at the left. It's a big machine. It costs money to build it. Put a roof over it, set it next to some curing kilns and you have a complete brick plant.

With this equipment, neither the material nor the finished product is touched by human hand from material pile to curing room. The machine does it all. It feeds itself from the mixer, with wet material, tamps the concrete into the series of molds that revolve on a cylinder (each tamper strikes 100 blows a minute), trowels the faces of the brick, finishes the sides, picks up the pallets, deposits the brick on the curing car and moves the car ahead to receive the next palletful.

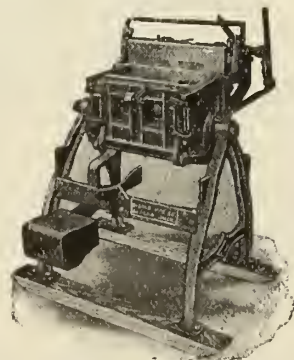
Speeded up so the molds travel nine inches every five seconds, it will turn out 60,000 brick per day. The concrete is tamped into the molds. Enough material is fed into each mold to leave a surplus after the tamper has rammed every bit into the mold that will go.



The first thing put into Besser Machines is Quality

Besser Face-Down Block Machine Uses WET Mixture.

The only face-down concrete block machine in which blocks may be made of wet material at great speed. With the machine in the position shown in the cut the material is tamped in, the mold box is turned over by touching the counterweight, the cores are withdrawn vertically and the block is delivered right into the operator's hands. Not a lost motion anywhere. The blocks of wet mix stand up. Send for special block machine catalog and learn more about this machine.

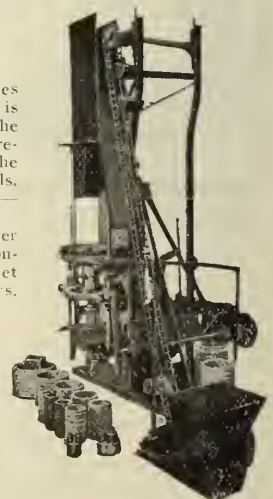


MIXERS Besser Simplified Continuous Mixers for plant use or for the construction job are the most reliable mixing machines built. Ask for prices.

Besser Power Tile Machines.

One of our power tile machines is shown here. The material is fed by the machine itself into the hopper above the mold. No revolving table to jar and jerk. The tile are packed hard. No culls. This machine eliminates one man—the man at the material boot.

Our machine for making sewer pipe automatically tamps the concrete into dense, strong pipe. Get our pipe and tile machine circulars.



BESSER MFG. CO. 105 12th. St. ALPENA MICH.

We manufacture the largest line of concrete machinery in the world. No matter what machine you need, write us and we'll send you special catalogs.

In writing Advertisers please mention CONCRETE.

"COMPELLED TO BUY ANOTHER"

Mr. Stingle, of Evansville, Ind., Finds That Hobbs Blocks Are in Demand.

"BEST BLOCKS I HAVE EVER SEEN"

F. H. Wotring, Morgantown, W. Va., Says the Hobbs Surpasses Any Block Machine He Ever Saw And Likes the Composition Face-Plate Idea.

Owners of Hobbs block machines everywhere are making money. If you are in the block business, you won't know how quick and sure success is until you have operated a Hobbs machine and shown Hobbs blocks to your architect and the contractors and home owners of your town.

Before buying a machine you naturally want to know what success others have had with it. We have hundreds of letters from owners of the Hobbs Block Machine. Two of these letters are printed below. The first is from the most progressive and successful block manufacturer in Evansville, Ind.

Evansville, Ind., April 22nd, 1912.
The Hobbs Concrete Machinery Co.,
Detroit, Mich.

Gentlemen:—

Replying to your inquiry as to our opinion of the Hobbs machine, by this time, we wish to say that the more we use it the better we like it. While your machine is perhaps a higher priced machine than many on the market we have never for a minute regretted the price paid for it and of all the machinery in the shop none has given us more satisfaction. Your face plates are simply immense. We are using a combination of white cement, sand and Green River stone dust for facing our blocks which makes such a good imitation of the real stone that it takes an expert to tell the difference between our blocks and real stone after the first whiteness has worn off.

There has been such a demand for Hobbs block that we fear that we shall be compelled to buy another machine. If you will sell the machine without the regular equipment of face plates, which we would not need in duplicate, the purchase of another machine may be taken under consideration. We will, of course, want many additional plates which do not belong to the regular equipment.

Yours very truly,
KEYSTONE CONCRETE CO.,
(Signed) E. M. Stingle, Secy.

Mr. Wotring, of Morgantown, W. Va., gave the Hobbs a thorough trial before writing us, but, like all other Hobbs owners, he had nothing but good words to say for the equipment when he did write.

Morgantown, W. Va., March 29th, 1912.
The Hobbs Concrete Machinery Co.,
Detroit, Mich.

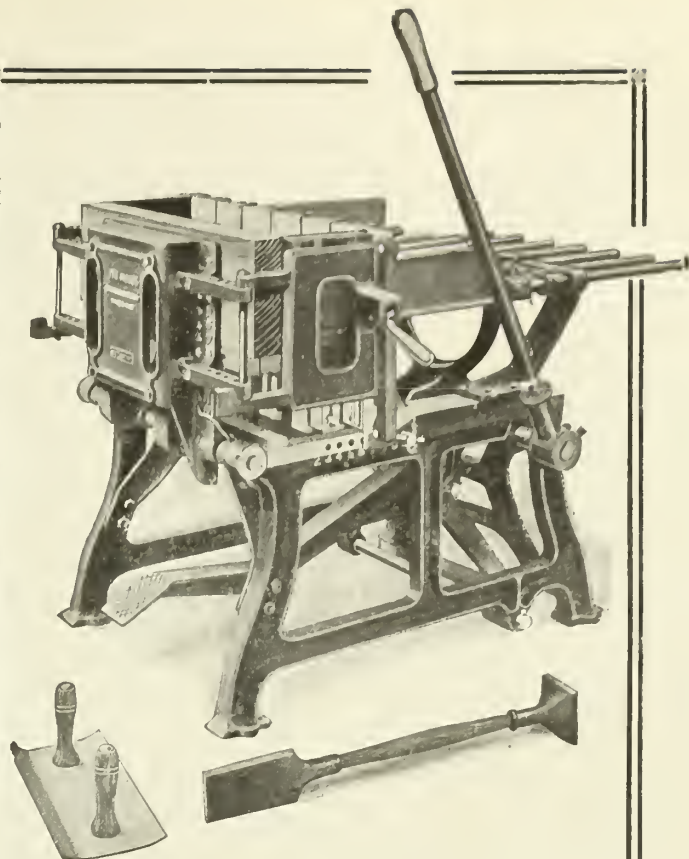
Dear Sirs:—

Some time ago I received your Hobbs Concrete Block Machine and after waiting until I had time to give it a thorough test I now wish to express to you my complete satisfaction with your machine. Your face plates are the best that I have ever seen and the working of the machine is extremely simple and satisfactory, while the product surpasses anything that I have ever seen.

I now have a contract for a building 28 x 32. Please send me your price on tampers as I want two, and paper for laying out Broken Ashlar work.

Wishing you much success, I am,

Yours truly,
(Signed) F. H. WOTRING.



THE Hobbs Block Machine is the best of its kind; its superiority is remarkable.

The Hobbs is simply built, but it will make over 2,000 sizes of blocks, and is changed from one size to the other with a few moves of the bare hands. It is either a 16, 20 or 24-inch machine and uses either wood or iron pallets.

The Hobbs, in fact, has so many valuable features that are new, that practically all Hobbs Machines sold replace less modern equipment. Probably the finest feature is the Hobbs Composition Rock Face Plates. These plates make a perfect rock face at no increase in cost.

Positively no other block machine can produce such natural stone; positively no other block machine can make you money like the Hobbs. Is it not worth while to investigate?

Send for our Catalog

Hobbs Concrete Machinery Co.
933 Scotten Ave. - - Detroit, Mich.



Reinforced Concrete Bridge over Huron River, Cross St., Ypsilanti, Mich. Length 178 feet; 46 feet wide and 35 feet high from bottom of piers. 4,000 barrels of Peninsular Portland Cement used in its construction.



USE Wabash Portland Cement

Best for All Kinds of Concrete Work
Great Strength and Durability. Fine Color and Uniformity

Sold by the Best Dealers

Wabash Portland Cement Co.

Phone Main 859

1824 Ford Bldg., DETROIT

WOLVERINE PORTLAND CEMENT

More Than Nine Years of Satisfaction

Unxcelled for Strength and Uniformity

Manufactured by the

Wolverine Portland Cement Company

COLDWATER, MICHIGAN

Write for Prices and Booklet.

W. E. COBEAN, Sales Agent, COLDWATER,



Why you should buy our Cement

It is exceptionally uniform in color.

It is ground fine—over 96% passes a 100 mesh sieve.

It is made under the COWHAM SYSTEM—a guarantee of worth.

It is made in large quantities—on good railway connections—insuring prompt shipments.



Write for the Northwestern Prices

When you are in the market for cement give us a chance to figure with you. Our cement has great strength—you should use it, and if you will write us we are sure we can get together.

Write for Our Book on Cement.

Northwestern States Portland Cement Co.
(COWHAM SYSTEM)

Works and General Offices,
MASON CITY, IOWA, U. S. A.

CONCRETE

VOLUME XII

JUNE, 1912

NUMBER 6



Use "Chicago AA" Portland Cement

"THE BEST THAT CAN BE MADE"

Our booklet, descriptive of the "Chicago AA" process, is free to cement users. Write for a copy today.

CHICAGO PORTLAND CEMENT CO.,
Dept. 86, Chicago, Ill. J. U. C. McDANIEL, Sales Mgr

Present Output 1,500,000 barrels annually

ALPHA PORTLAND CEMENT

The Recognized Standard American Brand



A strictly straight Portland which for uniformity and general excellence cannot be surpassed. It is absolutely pure and unadulterated. Contains no furnace slag or other by-products.

BEST IN THE WORLD FOR SIDEWALKS
Write for our handsomely illustrated book, sent free.

ALPHA PORTLAND CEMENT CO.
5 Centre Square, Easton, Pa.

BRANCH OFFICES: Board of Trade Bldg., Boston; Hudson Terminal Bldg., New York; Builders' Exchange, Buffalo; Oliver Bldg., Pittsburgh; Marquette Bldg., Chicago; Harrison Bldg., Philadelphia; Builders' Exchange, Baltimore; National Bank Bldg., Savannah.

"CONCRETE COSTS"

A book of great value to the designer, contractor and supervisor of concrete construction has just been published. It is by Taylor and Thompson the authors of *Concrete Plain and Reinforced*. The new book contains about 700 pages chock full of valuable data—definite, practical, instructive. \$5.00 is the price, sent postpaid, by the

CONCRETE PUBLISHING CO.
DETROIT, MICHIGAN

"LEHIGH" PORTLAND CEMENT

Recommended for high-class engineering work. High tensile strength. Finely ground, light and uniform in color.

LEHIGH PORTLAND CEMENT CO.
Head Office, ALLENTOWN, PA.

Main Western Office: 521-532 Peoples Gas Building
CHICAGO, ILL.



THE BEST FOR ALL USES



**WM. G.
HARTRANFT
CEMENT
COMPANY**



**Sole Selling
Agents
PHILADELPHIA
PA.**

**Real Estate Trust
Building**



ILLUSTRATED CATALOGUE SHOWING WORK DONE WITH THESE CEMENTS SENT FREE UPON REQUEST

ANNOUNCEMENT

To Our Readers and Advertisers

CONCRETE and Cement Age, of New York, (with which is combined Concrete Engineering) have been consolidated and the three papers will be issued as one under the name **Concrete-Cement Age**, starting with the July number.

Complete details of the consolidation will be found on page 25 of this issue of CONCRETE.

CONCRETE PUBLISHING COMPANY

TABLE OF CONTENTS, PAGE 23 DETROIT, MICH. ADVERTISERS' INDEX, PAGE 21

ONE DOLLAR A YEAR

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CONCRETE PUBLISHING CO.

FIFTEEN CENTS A COPY



Cheesman Memorial, Denver, Colo.
Marean & Norton, Architects

Approximate Cost \$100,000.00

MEDUSA WHITE PORTLAND CEMENT

USED FOR FOUNTAIN, WALL AND BALUSTRADES

WE ALSO MANUFACTURE

MEDUSA GRAY AND WHITE WATERPROOFED CEMENTS

MEDUSA WATERPROOFING

WRITE FOR FREE ILLUSTRATED BOOKLET AND SAMPLES

SANDUSKY PORTLAND CEMENT CO.

SANDUSKY, OHIO

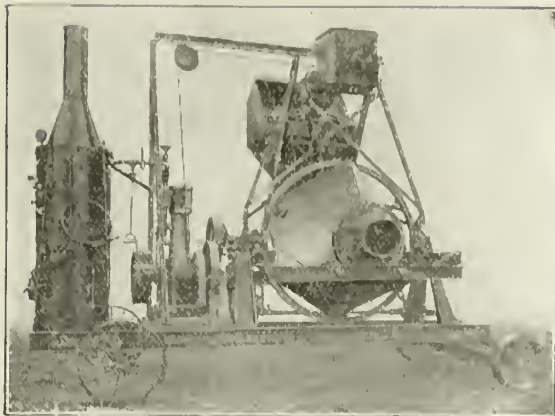


There's been a lot of
money sunk in the
concrete block busi-
ness and there's been
a lot made in it



The men who have made money have been successful because they have equipped themselves RIGHT to start with. There are hundreds of block machines you might buy. And after you've simmered the whole question down you'll find that the HERCULES Concrete Block Machine represents the following advantages that mean PROFITS: You can start with a standard HERCULES and one set of plates. You can add right on to that machine, plate by plate, as your business grows. You can make anything from a four-inch block to a six-foot sill. You never buy an unnecessary part. Your product is made FACE-DOWN of WET MIXTURE. Cores draw vertically—no sagging block. The Century Cement Machine Co., 285-295 St. Paul St., Rochester, N. Y., will send free a copy of "The Little Book." It fits the vest pocket. It contains the nub of the block business—the difference between a DRY tamp block and a WET process block. And it tells about the HERCULES Block Machine—lists outfits from \$95 on up. Send for a copy today.





There's Safety In Numbers

The man who bought the first concrete mixer (which was a cube mixer) did so because it was such a tremendous advance over hand mixing. The next fellow bought on the record of the first mixer—and so on—right down to the biggest builders and contractors buying

Austin Improved Cube Mixer

These contractors wanted just what you want—they demanded economical, quick charging, rapid, thorough mixing, lowest fuel costs, lowest maintenance repairs and greatest durability. The fact that the Austin Mixer has been used steadily is proof that they were satisfied.

It will produce three perfect batches to two of any other mixer in the same time—uniform, perfect concrete—that satisfies both architect and contractor; and at the end of the day the drum is flushed out in three revolutions.

Send for Catalog No. 28.

Municipal Engineering & Contracting Co.

Main Office—Railway Exchange Bldg., Chicago.

Eastern Office—30 Church St., New York City.

New England Agents—Dyar Supply Company, Boston.

San Francisco Agents—Lansing Co.

Western Pennsylvania Agent—J. S. Beckwith, 108 Parkway N. S., Pittsburg.

AGENTS WANTED IN OPEN TERRITORY

Cement Plants

**DESIGNED
EQUIPPED
BUILT**

For the Wet or Dry Process

Engineering of cement works our special and exclusive business; cement making materials investigated and reports made upon the results obtained from chemical and physical tests, with recommendations of the proper machinery for the preparation of same; estimates, plans and specifications furnished in complete detail and all construction and installation work carefully supervised.

Grinding Machinery

Special machinery for the preparation of raw materials by the wet process, including wet grinding and pulverizing machines, washmills and agitating tanks, slurry elevators and pumps, and wet screening machines, made for the most efficient and economical handling of the materials. Our

Kominuters and Tubemills

for the dry grinding and pulverizing of raw materials, clinker and coal are acknowledged as being better than any other grinding and pulverizing machinery.

F. L. Smidth & Co.

50 CHURCH ST., NEW YORK.

CONCRETE REINFORCING BARS

PLAIN, COLD TWISTED & HOT TWISTED

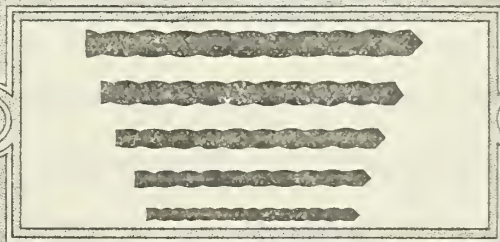
New Billet Stock

Billet Stock

Rail Carbon

MECHANICAL BOND WITHOUT EXCESS WEIGHT

All Sizes of Rounds, Squares and Flats



Large Stock of Cold and Hot Twisted Bars for Immediate Shipment

We solicit particulars of your requirements

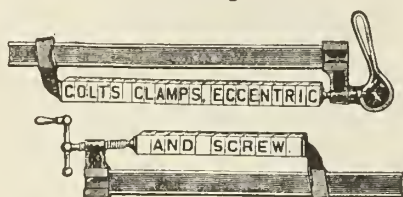
INLAND STEEL COMPANY

FIRST NATIONAL BANK BLDG. CHICAGO

WORKS: INDIANA HARBOR IND.-CHICAGO HEIGHTS ILL.

COLT'S CLAMPS

Will save you time in adjusting your moulds and in knocking them down after the work has set. Ask for catalogue No. 137.



BATAVIA CLAMP COMPANY.
69 CENTER STREET BATAVIA, N. Y.

IMPORTED CEMENT COLORS

Fast to Light, Air, Acid and Alkali That Are Being Used Satisfactorily for

**Stucco, Waterproofing,
Artificial Stone, Etc.**

Red, Buff, Brown, Green, Blue, Black
White, Etc.

Prices Favorable—Prompt Shipments—Quality
Always Uniform.

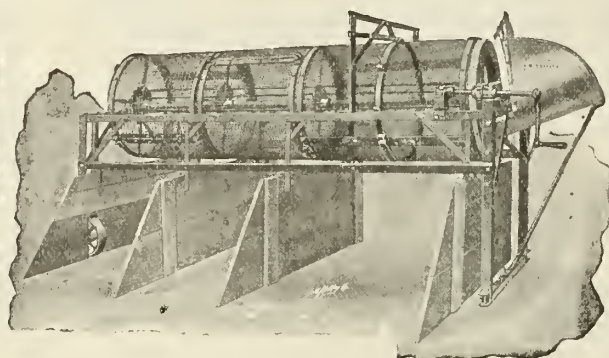
If you buy Colors, communicate with Headquarters,

J. W. Coulston & Co.

134 Liberty St.

NEW YORK.

"TIME IS MONEY"



Ready for Use. Front Wheels, Pole and Connections removed. May be replaced in a minute for moving

CONVERSE
Portable Rotary Screens
Always "ON THE JOB"

Because you can move the Screen to the material.
Any number of separations at one operation.
INTERCHANGEABLE SECTIONS.

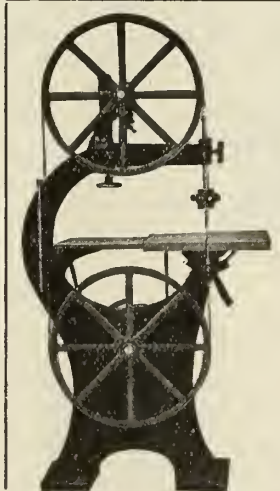
FOR HAND OR POWER.

Write for complete information and price.

F. S. CONVERSE, 101 Chestnut St.
BINGHAMTON, N. Y.

This Crescent Band Saw Makes \$1,000 a Year For One Concrete Block Man.

In the O. C. Barber concrete products factory, Barberton, O., a shop is maintained for making special wood patterns. A Crescent Band Saw was installed a year ago. Since then the pattern shop force has been cut down by one man and more and better work is being turned out. That means \$1,000 a year added to the profits.



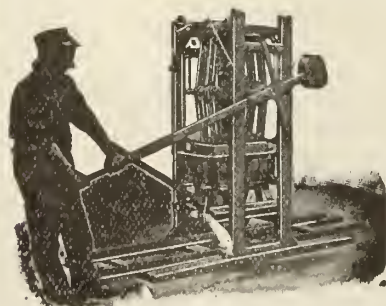
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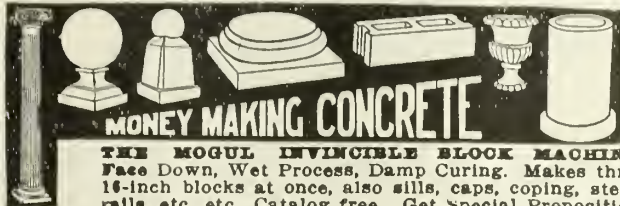
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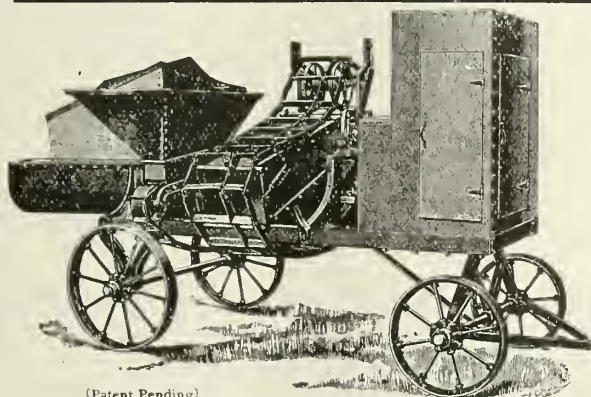


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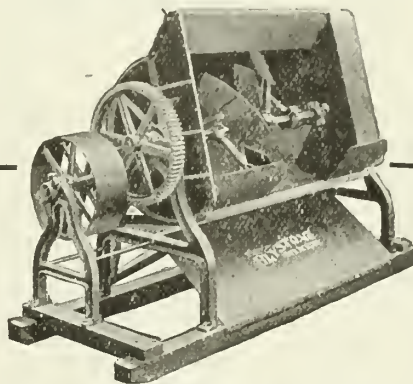
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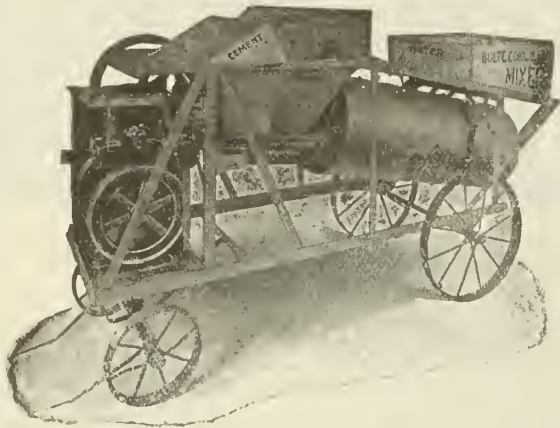
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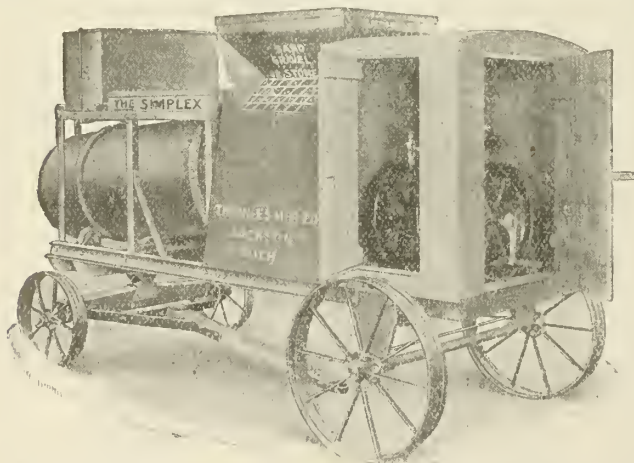
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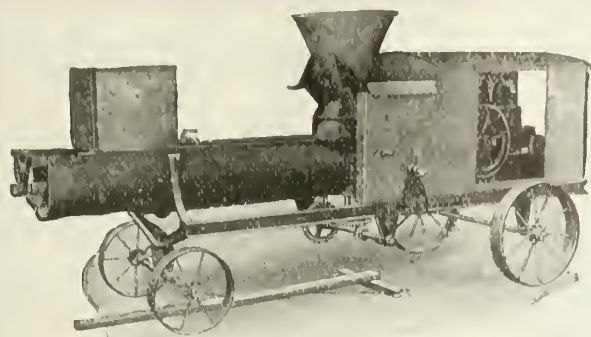
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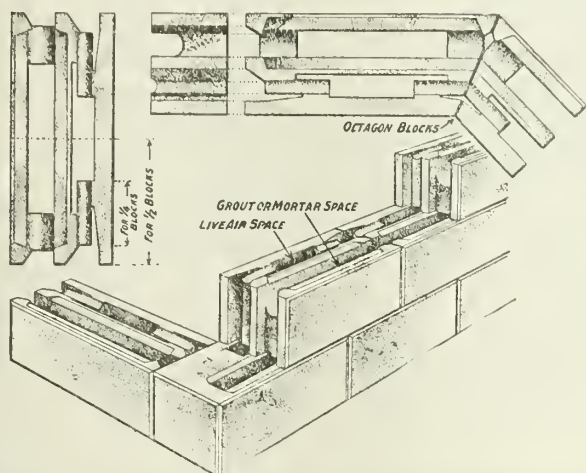
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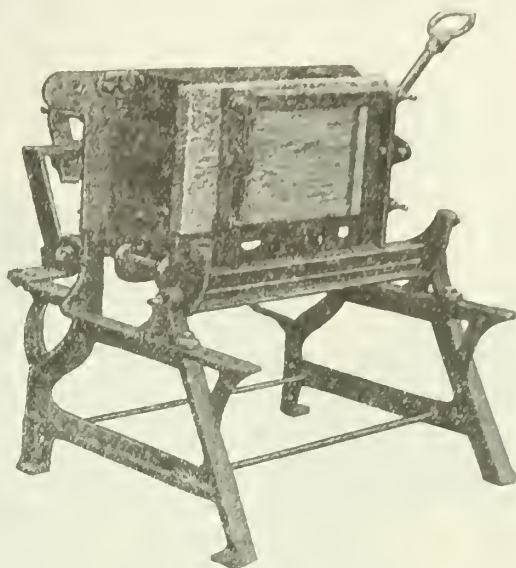


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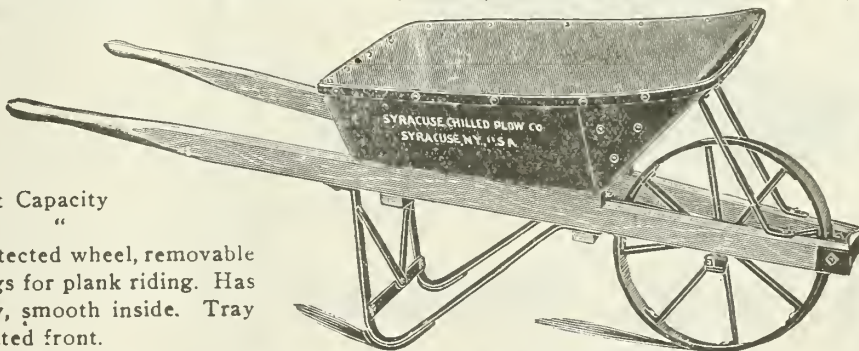
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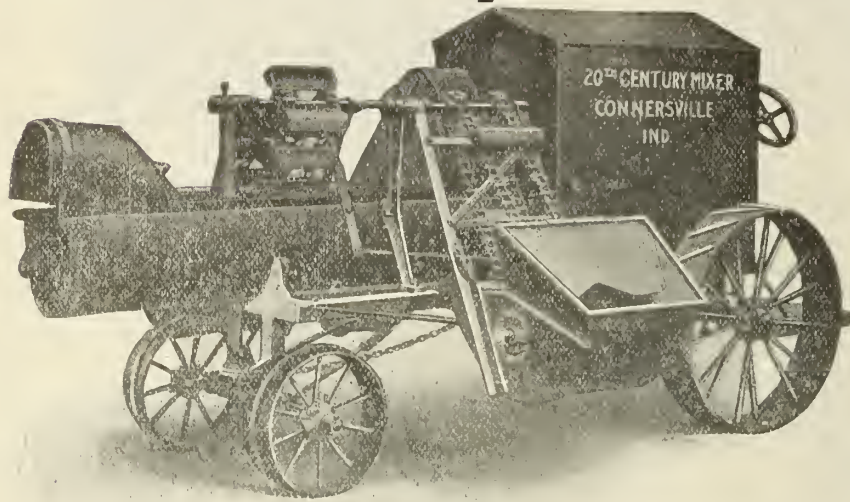
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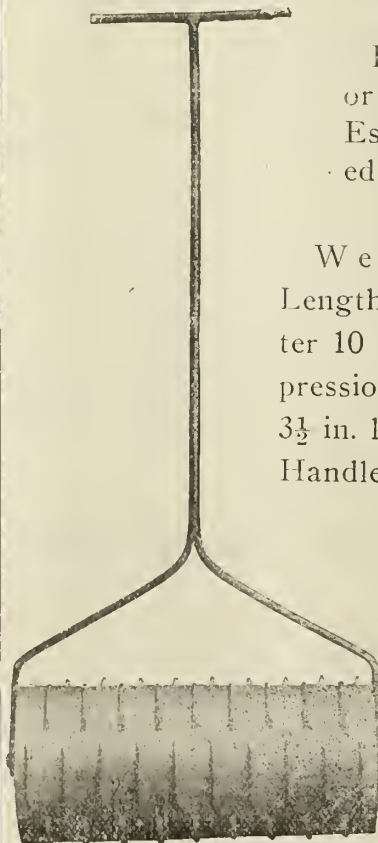
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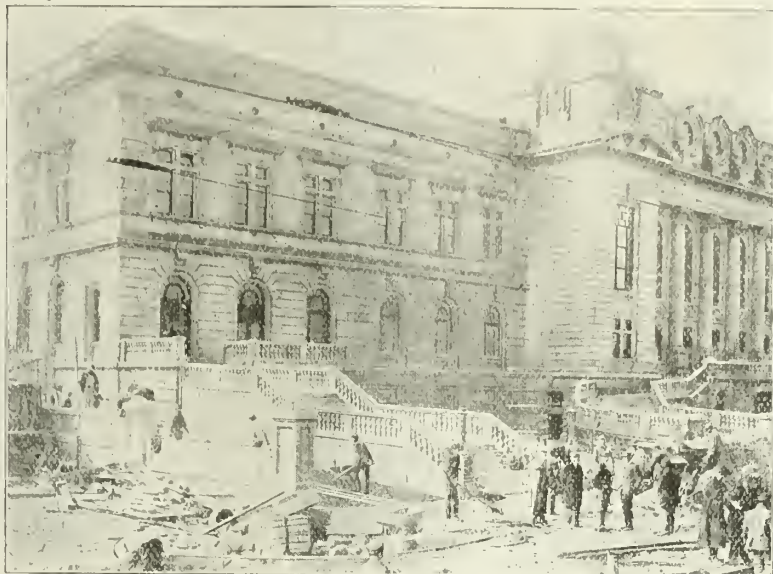
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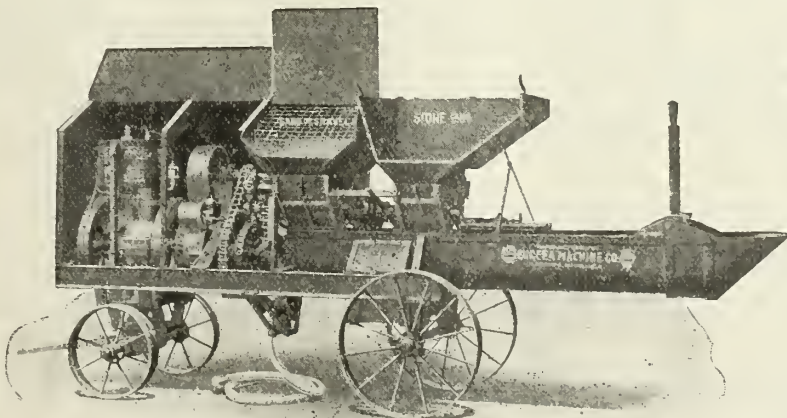
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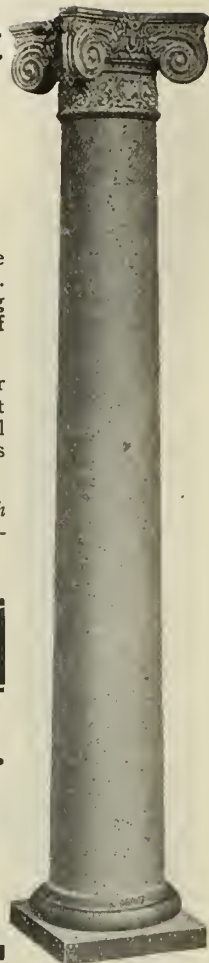
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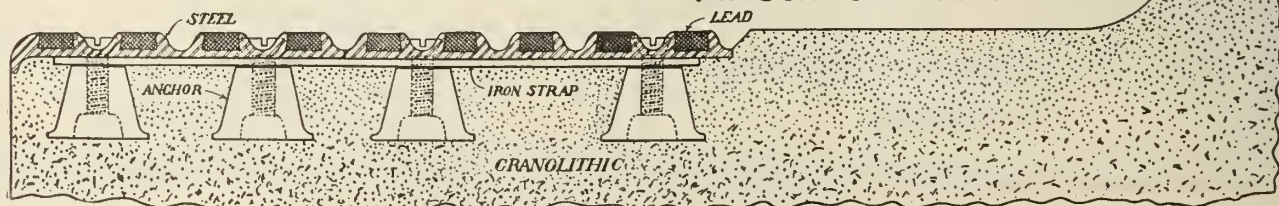
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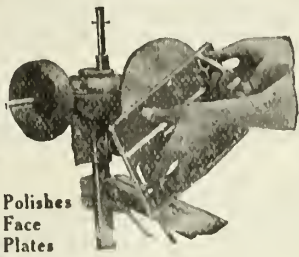
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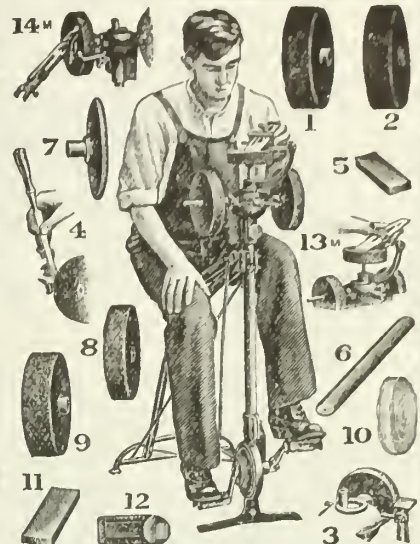
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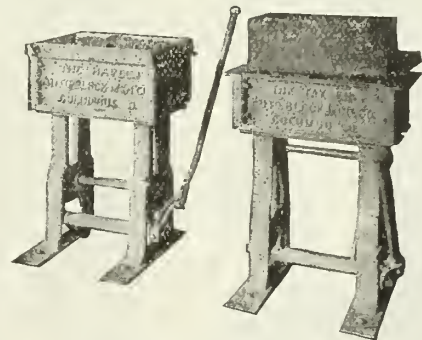
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Only trowel on the market designed specially for the block maker. Blade of the best saw steel, highly tempered and polished, with edges slightly rounded. Size 12 in. long, 5 in. wide. Very durable; brass handle; adjustable so worn blade may be replaced by a new one.



Ornamental Molds

You can order molds for a few ornamental pieces—pedestals, columns, caps, etc.—and as the demand increases for product, add to your line. Ask about our adjustable Angle Molds, adjustable Sill and Lintel Molds, etc.

HAYDEN AUTOMATIC BLOCK MACHINE COMPANY

112 West
Broad St.,

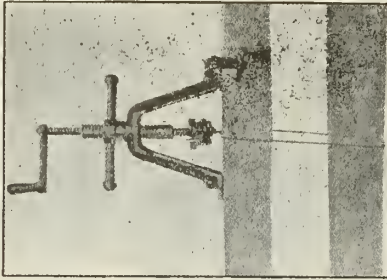
Columbus, Ohio

For Securing Wood Forms

Milwaukee Wire Tightener and Twister.

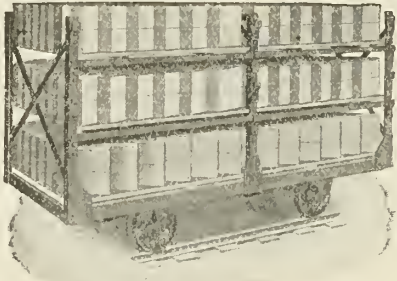
Why use cumbersome clamps or drive your lumber full of spikes? Hold your forms in place by wire on the outside. Tighten it—fasten it in place—with our Wire Tightener. When concrete is set, cut the wire and your timber is good as new.

This tool will pay for itself on the first job. Ask for circular and prices.



The Milwaukee Device Company

1287 National Ave., Milwaukee, Wis.



CHASE CARS

for handling Block, Brick, Tile, Sand, Gravel, Stone, etc.

WE MANUFACTURE A COMPLETE LINE

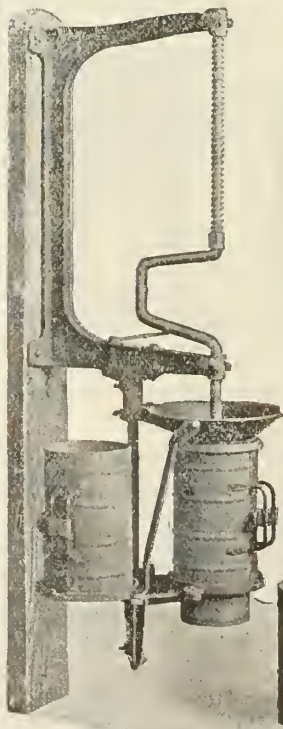
of cars for all purposes, in the plant or on the construction job. Write for Catalog.

The Chase Foundry & Mfg. Co.

Columbus, O.

Tile Machine

Hand Power



The Acme Tile Machine makes tile 12¼" long, from 3" to 8" in diameter. Spiral packer insures a good, strong tile that is handled while green without breakage.

Buy an Acme Tile Machine and get into the tile business with very little investment. Demand for tile is increasing. You can pay for your machine and show a good profit in a short time.

Write for folder describing and pricing this money-making machine.

Acme Tile Machine Co.

LaGrange, Ind.

Capacity 1,000 Tile per Day.

Cement Pipe and Tile

By E. S. HANSON

NEW EDITION

NOW READY

A working manual from start to finish. Takes up in detail the location, design and equipment of plants, methods of manufacture, kinds of machines, amounts of materials, figures, on the cost of production at various points, little "kinks" which will aid in satisfactory and economical production, etc. It will endeavor to be so complete as to furnish an answer on almost any question which can arise with regard to this important branch of the concrete business. More space will be devoted than heretofore to matters pertaining to large pipe for transmission mains, sewers and the like, giving a considerable amount of data from various cities and other places where large pipe has been used. Sent prepaid for \$1.00.

The Cement Era Publishing Co.

Chicago

Cement Directory

1912 EDITION

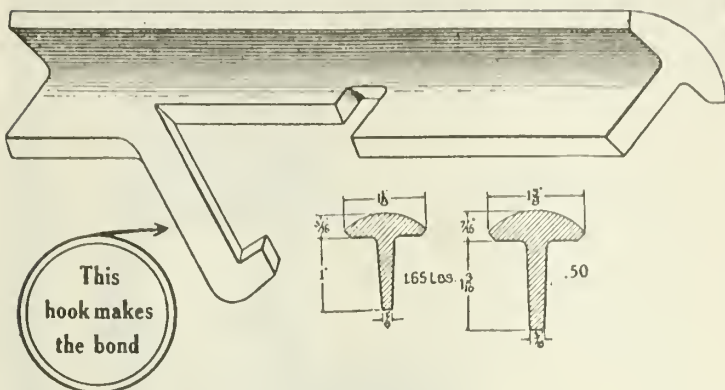
NOW READY

A thorough revision of the well known Directory of Portland Cement Manufacturers, together with Manufacturers of Gypsum and Lime, bringing down to date descriptions of manufacture, capacity, capitalization, accompanied by names of officers and superintendents, post-office addresses, a list of brands and a buyer's guide.

This directory stands alone. It has an established reputation of six years as reliable, up-to-date and authentic, complete, neat and handy. Is so useful and handy to anyone in these industries that it is almost indispensable. Order now for immediate delivery. Sent postpaid for \$1.00. Contains 250 pages, 3 x 5 inches, to fit the pocket; bound in black flexible leather covers; gilt edges.

The Directory of Port and Cement Manufacturers

1207 Morton Bldg., - Chicago, Ill.



Protect and Reinforce the Corners of Your Concrete Curbing

City engineers and contractors who have had trouble with the old sandstone curbs or with plain concrete curbing, realize the need of a curb whose corner is properly protected against wear.

EBCO Hook Curb Bar

is a steel member to be embedded when the concrete is poured, forming a permanent protecting edge and acting as a reinforcing member as well.

These bars have shear members which bond perfectly with the concrete. Rolled in straight lengths and in curves for street corners. They come in 10 ft. lengths, seven anchors in each length. Write for circulars.

EDWARD E. BUHLER & COMPANY
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Milwaukee: The Contractors' Co-operative Co., Merrill Bldg., Milwaukee, Wis.

Steubenville, Ohio: Central Sewer Pipe & Supply Co.

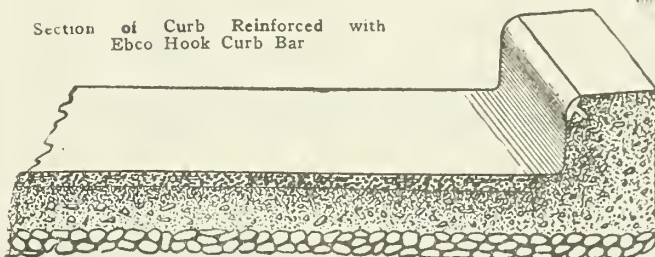
Indianapolis, Ind.: Indianapolis Mortar & Fuel Co., 407 Odd-fellow Bldg., Indianapolis.

Detroit, Mich.: F. G. Hall, McGraw Bldg., Detroit.

Pittsburg, Pa.: Houston Bros., 32nd St. and Pennsylvania Ave., Pittsburg.

Albany, N. Y.: Albany Bldrs. & Supply Co., Albany, N. Y.

Section of Curb Reinforced with EbcO Hook Curb Bar



Make Lower Bids—And Higher Profits BY USING OUR LONG HANDLED FINISHING TOOLS

One finisher can do several times as much work in a day as he can with hand tools: smoother work, too. Tools are equipped with long handles to enable operator remain standing at his work. Saves backaches and sore knees. Finisher trowels backward and forward across the walk. All the work may be performed from one side of the walk. Our patent device automatically tilts the edge of the trowel blade to prevent digging into the mortar.

SENT ON FREE TRIAL—No Cash in Advance

Any tool or complete set sent to any responsible contractor on 10 days' trial. No cash in advance. Try them on your own work before paying for them. We make trowels, jointers, edgers, floats, etc.

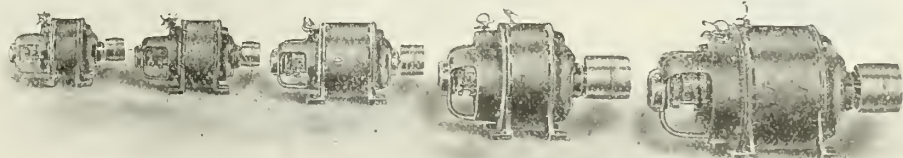
Free catalogue mailed on request—send in your postal today. Address

Twentieth Century Manufacturing Co.,

1650 LOWE ST., - - - CHICAGO HEIGHTS, ILL.



Let a
little
Motor
run it



Sterling
Motors
are
dependable

Steady, Reliable, Economical POWER

No matter whether your power-driven equipment is portable or stationary, you'll find that a Sterling Electric Motor will be the most satisfactory power unit. It won't cough, spit, balk, kick or die. Requires no supervision, delivers steady power under varying load at low cost.

Tell us what power your equipment requires, how the machines are arranged and whether your available electric current is "direct" or "alternating" and we'll tell you how to save time, money and bad words.

THE OHIO STERLING COMPANY, Dayton, Ohio

Manufacturers of Electric Motors for Concrete Machinery.

Thousands of money-making concrete products manufacturers maintain that the

Peerless Brick Machine

Has No Equal

The Peerless is made of high grade carbon steel and heavy malleable iron; it can't spring out of alignment as will sheet steel and angle iron, and will outlive its owner.

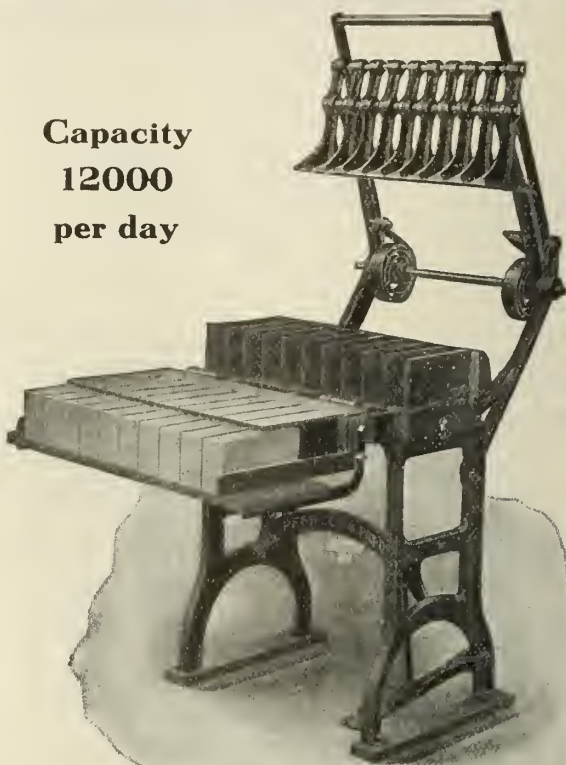
We guarantee its construction in the following unparalleled guarantee: If machine is broken or injured in operation we will replace any broken or injured part free of charge as long as machine is in the hands of the original purchaser. Will others do this?

Cement is at the lowest price ever known. Buy the machine that will make money for you. Write for catalogue and booklet on cement brick.

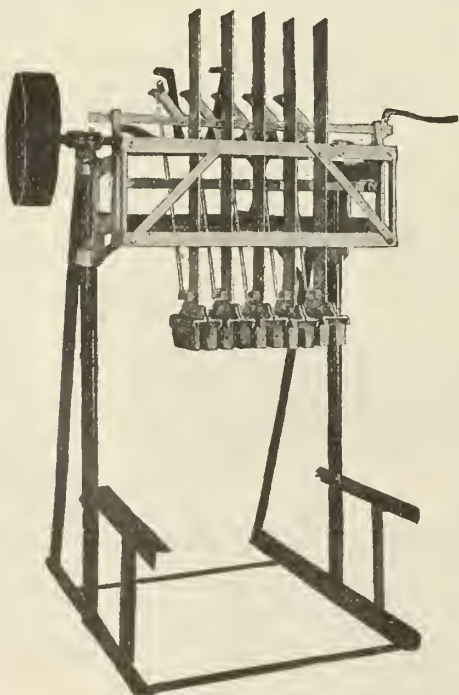
Peerless Brick Machine Co.

9 North Sixth St., Minneapolis, Minn.

Capacity
12000
per day



DON'T TAMP YOUR LIFE AWAY



You CAN'T make good blocks or brick or other concrete products tamping along by hand. Your men start off nicely in the morning but the strokes get lighter and lighter as the day grows—the last block tamped at night isn't anywhere near as dense as the first one made that day. And your output is limited by your TAMPING, not by the speed of your block machine.

Increase your capacity, improve your product and save backache by installing a

NOLAN AUTOMATIC TAMPER

Built of angle steel. Mounted on the floor or hung from the ceiling. Fits any block or brick machine. Size, number and arrangement of tamping arms easily adjusted to fit any machine. Each tamping arm delivers a 50-lb. stroke, SIX TIMES EVERY SECOND.

The device is so constructed as to operate with a minimum vibration and is practically noiseless.

The purchase of this tamper won't be an EXPENSE, it'll be an INVESTMENT which will yield 100% return in a few weeks.

Write for descriptive circulars and details.

Automatic Concrete Machinery Co.

141 East Fifth St.,

ST. PAUL, MINN.

CEMENTKOTE

The fact that many of the largest users of concrete in the country are using CEMENTKOTE—that the largest concrete elevator in the world is damp-proofed with CEMENTKOTE—only goes to prove our contention—

That—Every Builders' Supply Co., Contractor and Architect should know that—They can get a damp-proofing that will damp-proof.

That—CEMENTKOTE beautifies and prevents spotting.

That—CEMENTKOTE lasts as long as the cement itself.

That—CEMENTKOTE does not interfere with the chemical action of the cement.

That—Anyone can apply CEMENTKOTE.

That—CEMENTKOTE is made in soft and pleasing shades.

That—CEMENTKOTE is not an experiment. In other words every Dealer, Contractor and Architect should know all about CEMENTKOTE. Ask for samples and descriptive matter, or better still, ask to have one of our representatives call on you.

The Tropical Oil Co.

CLEVELAND, - OHIO

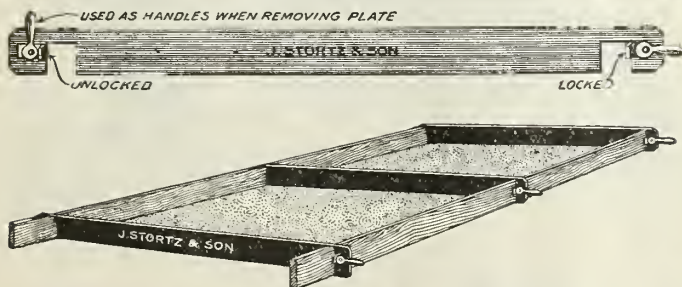
BITU-MORTAR WATERPROOFING WATERPROOFS PERMANENTLY

A bitumen preparation which bonds to old or new walls and waterproofs cellars and foundations PERMANENTLY, even when water is seeping through. Applied inside or outside of walls. Resists any water pressure that the wall itself will stand.

THE BITU-MORTAR CO.

342 E. 27 St. NEW YORK CITY

Send for a free copy of our book, "The Ideal Method of Waterproofing."



EXPANSION JOINT PLATES & FORM HOLDERS

No nails, no stakes, no braces, plates clamp securely to side forms, holding them in position. Perfect expansion joints produced. You save money on the cost of the walk and you produce a better job. Ask for catalogue including 150 sidewalk making tools.

John Stortz & Son

220-222 Vine St.

PHILADELPHIA, PA.

Cemeline

Richmond Bros.,
117 Sixth Ave. E.,
Cincinnati, O.

I enclose \$1.65 for 1 gal.
of CEMELINE

Name
No.
St.
City.
State.

If you want to make your concrete proof against water, fire, acids and alkalies, paint it with Cemeline, "cement's proper affinity." This forms an impervious coating which not only protects the structure but decorates it. It comes in nine colors. Send the coupon and get a sample can for trial.

Cemeline

CEMENT'S PROPER AFFINITY

CEMELINE is a thorough waterproofing. It hermetically seals the surface of the concrete, filling all the voids. Prevents the appearance of stains. Colors the surface in pleasing tints without defacing the natural texture of the concrete.

It costs \$1.60 per gallon in 5-gal. lots. Send the coupon with \$1.65 and get a sample gallon. Try it. See how you like it.

RICHMOND BROS.

Paints and Varnishes

117 Sixth Ave. E., Cincinnati, O

Cemeline

50c. HAND-BOOK on Cement Sidewalk Building FREE

We want every Contractor to have a copy of this 50-page Illustrated HAND-BOOK.

Write for this Valuable Book Today

We will send you it FREE, together with catalogs on steel sidewalk and curb and gutter forms.

UBBINK STEEL FORM CO.

214-216 Pier St.

Port Washington, Wis.

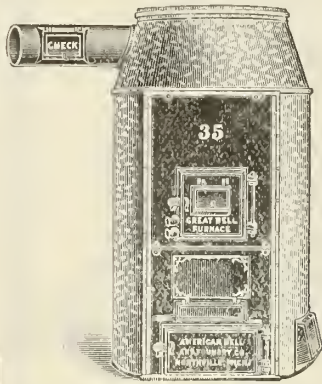
Coleman's Waterproof Filler

A waterproofing liquid that does the work effectively and permanently. A positive water resistant and shield against dampness and decay. Not a stain nor a coating but the only transparent waterproofing liquid FILLER patented. Chemically prepared and designed for waterproofing Concrete Blocks, Brick Walls, Stone, Wood, Plaster, Kalsomine. Penetrates the surface and becomes a part of the material to which it is applied. An honest compound. The best by test. Give it a trial. Send for Booklet.

Virginia Waterproofing Corp. Mfrs.

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NORFOLK, VA.



A HOT AIR FURNACE

For Less than
\$50 Complete

For 5 and 8 Room
Dwellings.

An unheard of Price
and a most Remark-
able and Indestruct-
ible Furnace.

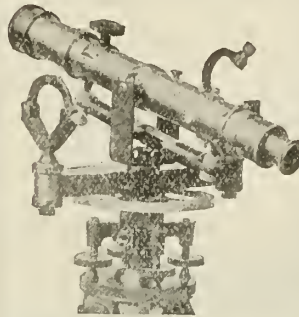
No Pipes No Lost Heat

**AMERICAN BELL AND
FOUNDRY CO.**

Northville, - Mich.

Why waste TIME and MONEY when you can save both
by using

White's Improved Level



at your work? This Instru-
ment is inexpensive and ef-
ficient and is made to meet
all the requirements of the
General Contractor. Full
particulars and catalogue
sent on request.

DAVID WHITE CO.

Dept. K., 420 E. Water St.,
MILWAUKEE, - WIS.

"STONEKOTE" — STUCCO READY TO USE

This prepared Portland Cement Stucco comes in 67 shades of White, Gray, Silver Gray, Buff, Red, Brown. This product will solve your stucco difficulties. Sample Free. We also sell Keene's Cement, Fire Brick for Kilns, R. I. W. Waterproof Paints, Hard Wall Plasters, and general building materials.

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909 Ch. of Com. Bldg., CHICAGO, ILL.

BOOK ON "HOW TO APPLY ROUGH-CAST"

This book tells how to apply Cement Stucco to get different finishes. Copy sent free on request.

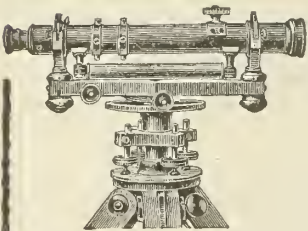


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134 to 140 Commerce Street

NEWARK, N. J., U. S. A.

High Grade Automatic Proportioning Machines
Rock and Shale Clinker and Gypsum



LEVELS

The purchase of a level or a transit isn't an expense, it's an investment. Many times, by avoiding errors, you can save the cost of the instrument on one job. Mistakes are expensive. Engineers, contractors, architects and builders who use Kolesch levels have error-proof work.

KOLESCH & CO.

Surveying Instrument Makers.

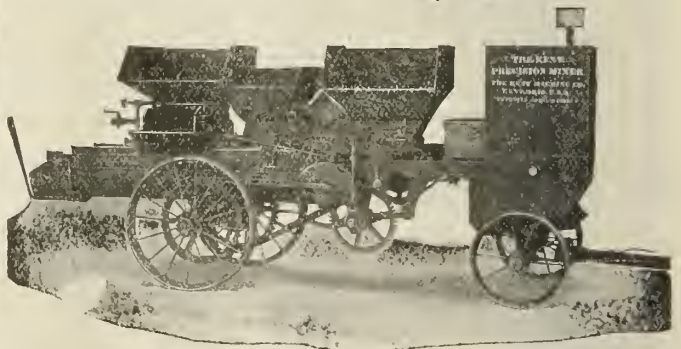
Established 1885

138 Fulton St.

NEW YORK

The "Kent" Precision Mixer

It is a well built concrete mixing machine built on scientific principles. It measures and proportions materials accurately and delivers mixed concrete at lowest cost. Get our mixer catalog. Ask about the "Kent" Mortar Mixer.



Address our Home Office or the following
Representatives

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Sanford Concrete Machinery Co., Toledo, O. The W.
E. Austin Co., 2 Spring St., Atlanta, Ga. New Orleans,
Houston, Dallas, Oklahoma City, Memphis, Roanoke and
Norfolk.

VAN DORN'S Steel Joist Hanger

Specially Adaptable for

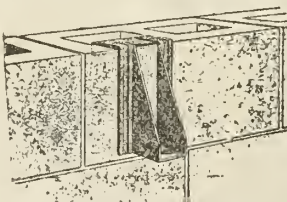
Cement Building Block Construction, Brick
Walls, Wood and Steel Beam Girders

SEND FOR CATALOGUE

The Van Dorn Iron Works Co.

CLEVELAND, OHIO

Structural Steel and Ornamental Iron Workers



GOOD LUCK TO ALL WHO USE BERGER'S *Radiant* SIDEWALK LIGHTS

The efficiency of our system is acknowledged as unsurpassed.

The simplicity of the construction makes the installation more easily and quickly accomplished than is possible with any other system on the market.

The heavily galvanized steel forms are self-centering and require no false work. The average concrete worker can do a good job with them. That means a minimum construction cost.

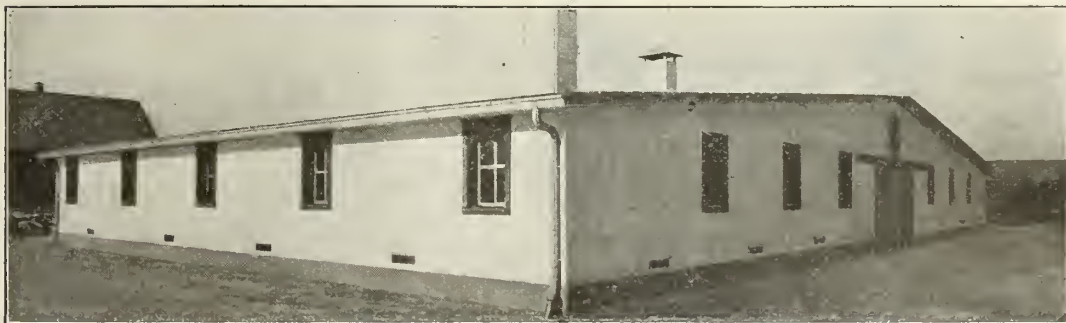
If you do not have our catalog—get it at once.

THE BERGER MFG. CO.
Canton, Ohio

For the best service address nearest branch.

New York	St. Louis
Boston	Minneapolis
Philadelphia	San Francisco

Also manufacturers of Concrete Sidewalk Forms, Ferro-Lithic and Multiplex Reinforcing Plates, and Sheet Metal Building Material of all kinds.



HY-RIB Concrete Barn (built without forms), Walker Bros.' Farm, Walkerville, Ont.

HY-RIB—Concrete Work on the Farm without Forms

HY-RIB does away with the expense of centering, wood forms and special equipment. Anyone can use it. Adapted to any style or size of structure. Simply set up the HY-RIB, apply the cement and the work is complete.

HY-RIB reduces the cost of construction and gives buildings which cost nothing to maintain. Save insurance. No expense for paint or repairs. HY-RIB buildings are handsome, strong, permanent, fireproof and ratproof.



HY-RIB Concrete Silo—No forms used.



HY-RIB STEEL SHEATHING

HY-RIB is a steel sheathing with deep stiffening ribs, a combined unit of reinforcement, centering, lath and studs for concrete and plaster work.

Are You Going to Build? Valuable Building Books and suggestions FREE, if you mention your proposed building.

TRUSSED CONCRETE STEEL COMPANY

650 Trussed Concrete Building

DETROIT, MICHIGAN



Diamond Expansion Bolts

For fastening all kinds of material to Brick, Stone or Concrete.



"Diamond N" Screw-Anchor

"Diamond N" Steel Drill

Write for samples and pamphlet and how to use them.

Diamond Expansion Bolt Co.

90 West Street, New York.

RELIANCE

CRUSHERS and PULVERIZERS

ARE THE PREMIER ACHIEVEMENT
IN THIS CLASS OF MACHINERY.

THE MANY VALUABLE FEATURES EMBODIED IN
THEIR MAKE-UP ARE EXPLAINED IN OUR
CATALOGUE WHICH IS FREE FOR
THE ASKING.

UNIVERSAL ROAD MACHINERY CO.

KINGSTON, N. Y.

BRANCH OFFICES

NEW YORK

BOSTON

ROCHESTER

← Can You Read This

It is a reduced photographic copy of the back cover of a publication issued by Deodato & Rubel, ornamental concrete workers of Alexandria, in far off Egypt. It is an appreciative reference to the fine work done in a

gentina. Also in every state and territory in the United States. More than 40,000 of them. And we are shipping more of them every day. We have not a single dissatisfied customer that we know of.

SIMPSON MOLD

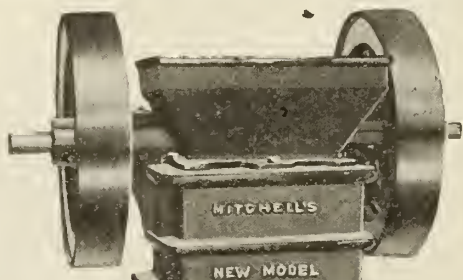
The same publication contains illustrations of many other designs made in the Simpson Molds, a good many of which are in use in the Land of the Pyramids. Our molds are producing fine work in more than twenty foreign countries, from Hawaii to Trebizond in Turkey in Asia, and from Alaska to Ar-

Do not these facts indicate that Simpson Molds are O. K.? Sure! And they make it easy and safe for us to guarantee the molds absolutely. Every cement worker finds them profitable, no matter where located.

We want to send to Cement Men our full catalogue, and to all interested persons our illustrations of beautiful concrete verandas. Cement workers, please answer on their letter heads or enclose business cards.

THE SIMPSON CEMENT MOLD CO., 101 Vine St., COLUMBUS, O.

1912
MODEL



← To Be or Not
to Be Without
a "Eureka"—that
is the Question

?

After you receive our new 1912 catalog and have investigated the Eureka Improved Crusher and

found it to be the most efficient, most economical, as well as the simplest and most durable then ask yourself "Can I afford to be without a Eureka?"

No matter what you crush, the Eureka will save you money. It has a score of exclusive features—made in 15 different sizes in capacities from 5 to 300 tons per 10 hour day. Write today for new 1912 catalog. You can't afford to wait.

Canadian Factory
Mitchell Crusher Mfg. Co.,
Bathurst & Niagara Sts., Toronto, Can.

Eureka Stone & Ore Crusher Co.

1-3 B Avenue
Cedar Rapids, Iowa

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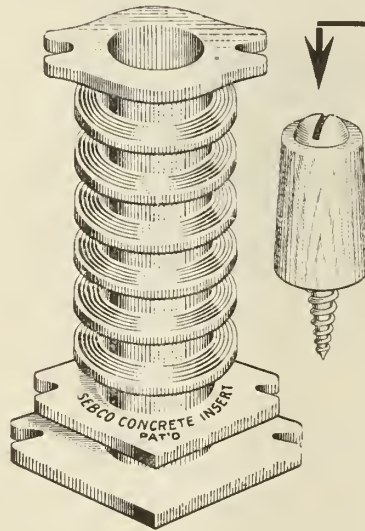
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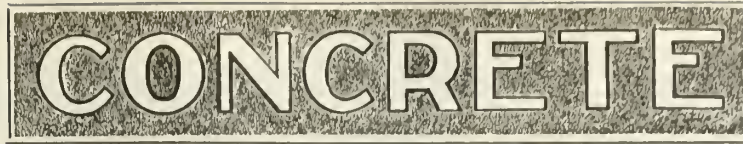
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Standard Journal
on Manufacture and
Uses of Portland
Cement.



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Correspondence solicited on all mat-
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Concrete Organizations, Officials and Conventions

Canadian Cement and Concrete Association; Secretary,
William Snaith, 57 East Adelaide St., Toronto, Ont.

National Association of Cement Users, Harrison Bldg.,
Philadelphia, Pa.

Cement Products Exhibition Co., 72 West Adams St.,
Chicago, Ill.; Secretary-Treasurer, J. U. C. McDaniel, 108
La Salle St., Chicago, Ill.

Northwestern Cement Products Association, J. C. Van
Doorn, Secretary, Security Bank Building, Minneapolis,
Minn.

Iowa Association of Cement Users; Secretary, Ira A.
Williams, Ames, Ia.

Nebraska Cement Users' Association, Columbus, Neb.;
Secretary-Treasurer, Peter Palmer, Oakland, Neb.

Oklahoma Cement Users' and Contractors' Association;
Secretary, D. C. Patterson, 336 Bassett Bldg., Oklahoma
City, Okla.

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CONCRETE

Vol. XII

JUNE, 1912

No. 6

Editorials

CONCRETE and *Cement Age*, New York, (with which is combined *Concrete Engineering*) have been consolidated and the three merged papers, under the name CONCRETE-CEMENT AGE, will be published as a unit, with offices of publication at Detroit and New York, beginning with the July, 1912, issue.

The importance of this announcement to the broad field of Portland cement concrete manufacture and use can scarcely be overestimated. All three papers have, with all due modesty, achieved enviable distinction in their separate fields of endeavor. All of them were firmly established, each with its individual aims and individual following, at the time the combination was effected. CONCRETE began publication in March, 1904, and was followed a few months later by *Cement Age*. *Concrete Engineering* was first published in 1907, with headquarters at Cleveland, and was combined with *Cement Age* in 1910, the first number of the joined papers being published in January, 1911.

While definite, and to an extent, different ideas originally dominated the management of each paper, all were broad-minded enough to build on a wide platform, with the same ultimate object in view. All three papers kept clearly in mind the betterment of conditions of manufacture and use of cement and concrete. All three acted as problem-solvers for the man who was in any way connected with the industry, manufacturing, merchandising or consuming. They have built up the right kind of reputation for reliability in all their statements, and they number their friends by the tens of thousands.

A combination of effort and ideals will give CONCRETE-CEMENT AGE an enormous opportunity to serve the industries that it will faithfully represent. Definite plans for covering the entire field have been made and will be carried out. With competent editorial management and an aggressive subscription campaign, the new paper will immediately become essential to the men who manufacture, sell and use Portland cement or concrete in any form.

The special field of cement-making, with reference to equipment, plant management and merchandising; the technical field of engineering, in relation to the use of reinforced concrete; the artistic field, as it concerns architects and architecture; the field of proper roadway construction and maintenance, for vehicles and pedestrians; the manufacturing field, from forms to bee-hives—all these will be adequately covered.

The strong features of each paper will be continued and amplified in the newer, larger and, we promise, better paper. The close personal contact between subscriber and editors will be made closer. Help in special and in general problems will be furnished and every effort will be made to advance the interests of cement and concrete and the men who have to do with them.

Special emphasis has been laid by the publisher of CONCRETE on *how* to do things. Detailed methods, comparative costs and cost keeping and all that concerns the production of the best output at the lowest expense—these have engaged our special attention. *Cement Age* has specialized on what is being done, and what ought to be

done to improve output and cut down expense. CONCRETE-CEMENT AGE will cover the whole field, wide as it is, with due regard to the interests of its readers. We realize the magnitude of the undertaking, but are confident that we are equipped to make the magazine invaluable to its readers.

We purpose publishing as adequate a paper in the interests of the industries to which we are devoted as is humanly possible. With this purpose in mind, we are confident of retaining the support of every friend we have made for three papers in the past, and equally confident of adding largely to their number every year.

CONCRETE-CEMENT AGE is a force to be reckoned with, to be used, by those who have to do with the world's most interesting and most rapidly developing industry—the manufacture and use of Portland cement. It is already an engine of publicity to deliver a steady stream of power to its readers.

* * *

Good Roads

FROM a period before his birth to one after his death, man is dependent upon proper means of transportation for everything that happens. He may not be born at all if the midwife or the doctor is prevented by impassable roads from reaching his mother in time. He may not even be decently buried if impassable roads prevent the undertaker from reaching his home or the hearse from bearing his body away. His life itself and what he makes of it are closely related to the transportation problem. If he lives in a community blessed with good roads, he is brought at once into communication with civilization and its advantages. Schools, books, art and the refinements of life are brought to his door; good food is made possible for him. His opportunity for developing into a useful member of society is in direct relation with the character of the roads in his neighborhood. If they are good, so is his opportunity; if they are bad, so are his chances to become a good citizen.

Dwellers in cities and in enlightened sections of the rural country can scarcely realize the conditions encountered by the dweller in communities in which communication with the source of supplies depends upon the weather and the season of the year. Good roads are in no sense a luxury; they are a vital necessity to community and to individual. In thousands of localities, the citizens are isolated and subject to the whims of the weather man for their means of communication with all that makes life worth living.

No human being escapes the benefits of good roads, but the people taxed to construct and maintain them are those most directly benefited. Certain village, county and state taxes are in the nature of insurance only, so far as a majority of the citizens are concerned. The poor fund, the fund for maintaining asylums and almshouses and other large expenditures are borne by the many for the benefit of the comparatively few. But good road taxes are borne for everybody, for the good of everybody.

Nor is the tax high, in any well organized com-

munity. It is estimated that an average tax of 35 cents for \$1,000 of assessed valuation in Wayne county, Michigan, cares for her splendidly built and maintained roads. In practically every county, the big city pays the largest share of the road tax—and justly so, for her citizens are most largely benefited, both directly and indirectly. The farmer has from time immemorial been accused of objecting to a tax of any kind, as he formerly objected to almost every other form of cash outlay. This is no longer the rule in general, for the farmer is prosperous, alert to take advantage of labor-saving equipment and a liberal spender for what he needs or desires. He no longer objects to the good roads tax; the advantages to him are too obvious and too numerous to escape him.

Good roads are admittedly essential to the welfare, present and future, of society as a whole. It remains only to determine what type of good roads shall be used. The prime considerations in roadway construction are, first, excellence; second, low first cost; third, low maintenance cost. And the answer to all these requirements is *concrete*. A careful survey of roads of many materials, of varying ages, in different communities, presses home the fact that in all the essentials the roadway of concrete is the best in the long run.

* * *

Growing

The block maker with a mold, a shovel and a sand pile was the father of an industry which couples increasing exactions with expanding opportunities. We must not be too harsh in criticism of some early attempts to make units of concrete for building purposes. Through the early mistakes, not only in the physical quality of the concrete, but in the aesthetic considerations of design, the concrete products manufacturer of today with his improved machinery and equipment, his more abundant knowledge of the strength and characteristic qualities of materials and his concern over greater nicety in the manipulation of these materials, is able to work real wonders in Portland cement and the aggregates which it binds.

* * *

Like every industry which has progressed beyond the stage of the experimental shop, concrete products manufacture is made more attractive by the business methods which have been brought to its support. With the increase in the items of equipment necessary to conduct a modern plant in this line, the increase in the number of persons finding employment in such a factory and the great increase in the number of products which it has been found profitable to make under one roof—with these has come the systematizer. Chance methods of manufacture, chance systems of cost keeping, prices based upon guesswork proved to be the foes of progress and today the concrete products manufacturer is busy educating himself not only in every feature of the art and the craftsmanship of his work, but also in the profitable marketing of his output.



Concrete Products in White Cement

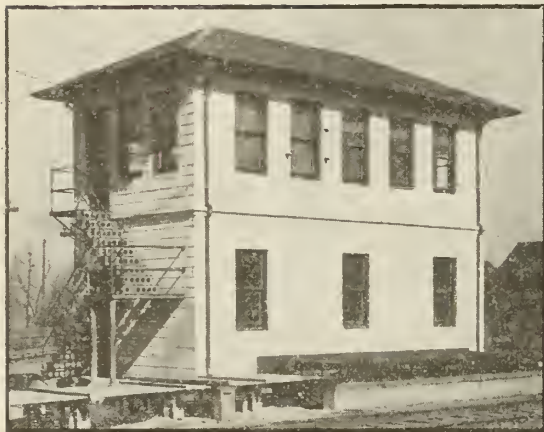
Above—Park View Apartments, St. Louis, Missouri; Edward F. Nolte, Architect; Yourtee & Hubbell, contractors and manufacturers of concrete dimension stone—the stone in this case being faced with Medusa white Portland cement.

Below—Concrete castings made by George Rackle & Son, Cleveland, Ohio, for Tripp's Dancing Academy, St. Louis, Mo., using Medusa white Portland cement in the facings.



Showing Some of the Uses of Concrete Products

In the order shown (left to right and top to bottom) are: Lake Shore & Michigan Southern Railway switch tower, at La Porte, Ind., one of many constructed of Ideal concrete block; Molsons Bank, Revelstake, British Columbia, built of Ideal concrete block; house in Winnipeg, Manitoba, built of Pauly hollow concrete tile, manufactured by the Perfection Concrete Co., Ltd., Winnipeg—the house wall afterward being covered with stucco; South Bend & Northern Indiana Railway interurban station at Elkhart, Indiana, built of Ideal block and stone; C. G. Conn musical instrument factory at Elkhart, Indiana, built of Ideal concrete block and finished with stucco.



Economical Products Plant Arrangement

Concrete Block and Dimension Stone Factory at Pawtucket, Rhode Island, Described

The drawings shown herewith convey some idea of the concrete products plant arrangement by which the Builders Concrete Stone Co., Pawtucket, R. I., aims to economize in handling materials, both raw and finished.

C. J. Rowley, treasurer of the company, wrote to CONCRETE in response to its request for suggestions* of value to concrete products manufacturers, and as a basis of comparison of arrangement, he contrasts his own plant with that of O. C. Barber, Barberton, Ohio, which was described in the December, 1911, issue of CONCRETE. Mr. Rowley says that he believes the layout of his plant at Pawtucket is more economical than that at Barberton. He declares that he is able to do the same work in his plant as is done in the plant at Barberton, although the plant occupies much less space than that operated for Mr. Barber. The Barber plant is 130' 10" x 82'. The Pawtucket plant is 80' x 50'. There is a second story over part of the Pawtucket plant providing a space 28' x 50', in which the office, drafting room, pattern shop, watchman's room and gravel bin are accommodated. The gravel bank is within 20' of the building and one man wheels the gravel to the bucket conveyor which takes it up to the top of the bin in the second story. From this bin it drops directly to the mixer, as will be seen in the section drawing. The mixer used is the National continuous, which measures the gravel as it comes down the chute from the bin and throws it into the mixer drum. By the arrangement of this plant, one man combines three duties in connection with the plant. He is engineer, fireman and mixer man, all in one. He feeds cement (cement is kept in the corner nearest the mixer) into the hopper and when mixed with the water and the gravel falls on the concrete floors in front of the two block machines shown at 2 and 3 on the first floor plan. The block machine at 3 is equipped with an Ideal automatic tamper. Machine 2 has no tamper and is used almost entirely to make fractional block and Mr. Rowley says it is not so convenient to use the tamper to make fractional block, so all these are hand tamped. The two machines numbered 5 are chimney block machines. These machines are of Mr. Rowley's own make, and he finds them very profitable. One machine makes a block with a flue 8" x 12", the other a flue 10" x 14". These machines are not operated all the time. When they are operated, two men take the gravel from the bank, mix

it by hand, and make 100 chimney block per day. These block sell for 25c and 28c each.

The power used in the plant is steam and is transmitted by belts and shafts. The boiler is on the same level as the curing rooms and the main supply pipes are run overhead through a reducing valve. The 60 pound pressure is brought down to a 5 pound pressure in the steam rooms. From the main supply pipes, the pipes in the curing kilns drop at each end of the room to a trench in the center of the floor of the room. This trench is 10" deep, so that the steam pipe can be laid with a pitch of 5", and the return pipe also with a pitch of 5". It is 1½" pipe with pet-cocks every 5' throughout the entire length of the room. Mr. Rowley says that this gives an even distribution of steam and that the block are cured in a manner entirely satisfactory. In the summer, the temperature runs up to about 120 degrees Fahr., and in the coldest weather it is not lower than from 50 to 60 degrees Fahr.

The number of employes in the plant varies with the season and the demand. When running at full capacity, the force is as follows: Mr. Rowley, who describes himself as salesman, collector, superintendent of outside construction and general manager of the plant; a young woman who keeps books and serves also in the capacity of draftsman (inasmuch as no job, however small, is sent out without a plan and schedule; the plan is sent with the goods and the schedule retained in the shop, so that if a duplicate order is received, it is necessary only to turn to the original schedule); an engineer, who operates the mixer; another man who attends to the shipping of the product from the yard and who acts as manager in Mr. Rowley's absence. Then there are two men for each of the two block machines, and two men to make chimney block.

Men employed at the block machines are aware of a definite arrangement in the matter of output. From the block machine equipped with power tamper, two carloads of 24 block each or 48 block in all, are required per hour. Twenty block per hour are required from the chimney block machines, and 20 block per hour from the machine in which fractional block are made, having no power tamper. The shop is in operation 9 hours a day. If there is an extra demand for block the power tamper machine can turn out 450 block per day, but when the two men at each machine divide their time, which is usually the case, they are required to turn out 48 block per hour. A record has been made of turning out 28 block in 20 minutes, but the men found it impossible to keep up that pace for a full day. Two men are employed constantly in the plant making dimension stone.

Mr. Rowley supplies some data which, doubtless, will prove very interesting to many products manu-

*Mr. Rowley is awarded the \$10 prize for contributing the most valuable ideas. The value of the ideas appears to be in the attention given to the matter of economy of operation quite as much as in the results obtained and it is this emphasis of detail which CONCRETE is glad to pass along to other manufacturers.—Editors.

facturers. On July 15, 1911 (this is a daily memo. picked at random), the plant used 75 bags of cement,

paid \$21.50 for labor of ten men, and had an output as follows:

- 49-16" block.
- 18-12" block.
- 2-11" block.
- 2-10" block.
- 49-8" block.
- 360-24" block.
- 23-16" block.
- 23-8" block.
- 1-7' 6" step.
- 20 post caps 14" x 14".
- 2 post pieces 16" x 16".
- 5 steps each 5' long.

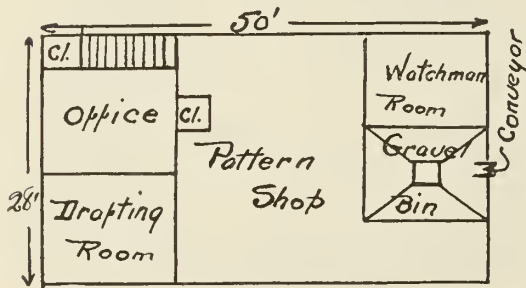
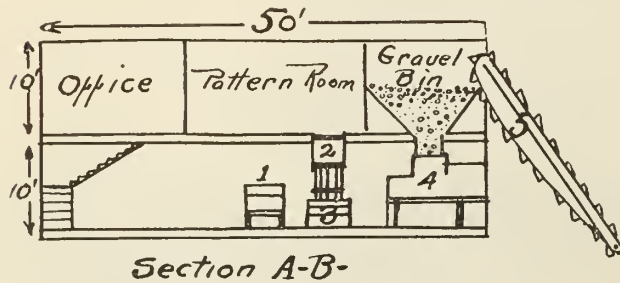
The value of this material in the yard was figured at \$112.20.

Outlay for the day was as follows:

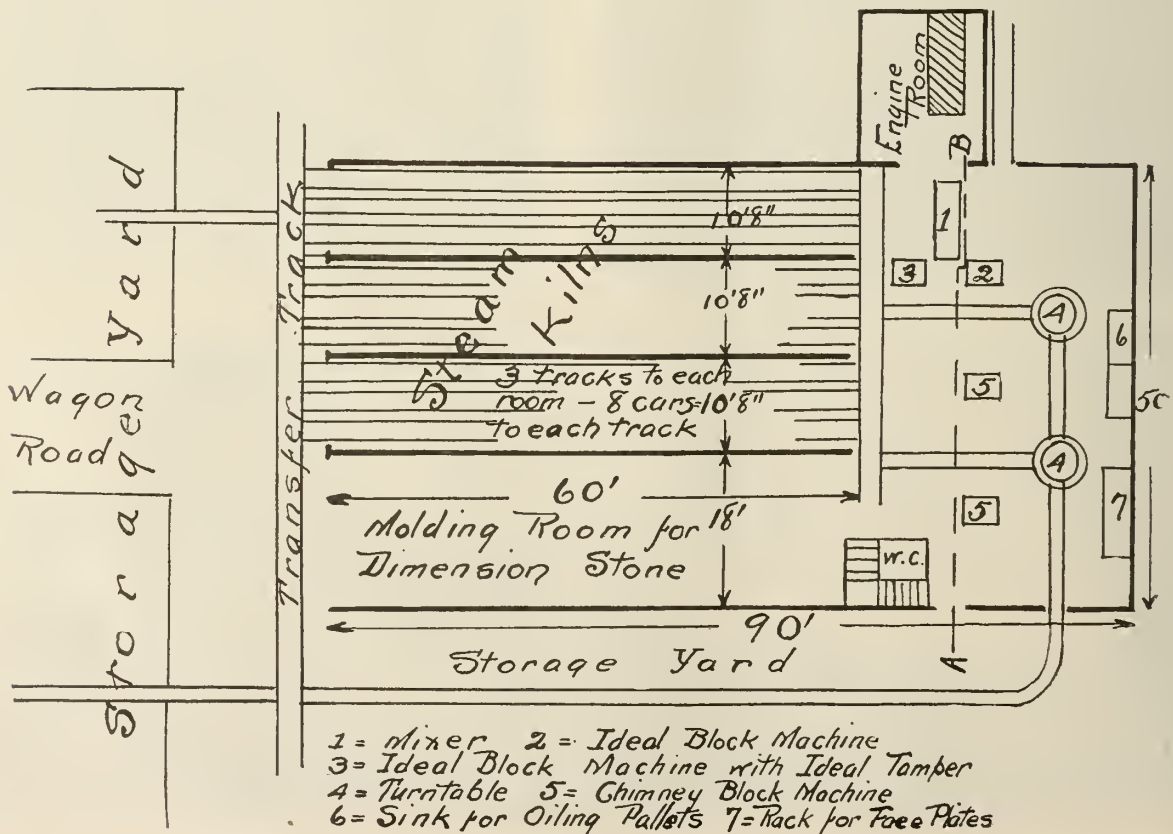
Cement	\$28.00
Labor	21.50
Expense:	
Interest on investment.....	\$ 3.00
Office help	6.50
Coal	2.00
Oil	.50
Repairs	2.50
Lumber	.25
Depreciation	3.25
	\$18.00

Total\$67.50
Profits for the day.....\$44.70

This expense item of \$18.00 is fixed and is charged up every day. Is based on the expense for a year



- 1= Block Car 2= Tamper
3= Block Machine 4=Mixer
5= Bucket Conveyor



in the various lines mentioned in the expense account.

On August 5, 1911, with eleven men working, the output was worth \$143.75.

Cement cost	\$28.80
Labor	23.50
Expense	18.00

Total	\$70.30
Profit	\$73.45

In winter, when there is less work, a typical day with four men employed shows up as follows:

Cement	\$10.50
Labor	13.67
Expense	18.00

Total	\$42.17
Stock manufactured	\$47.69
Profits	5.52

It might be mentioned here that Mr. Rowley appears to charge up nothing for aggregate, but he may figure that his supply of gravel is inexhaustible, and that the time will not come when he will have to buy a new gravel bank, or have his gravel shipped in.

A party of about 75 Portland cement manufacturers and others visited Detroit, Mich., May 10,, going by special train from Chicago, where a meeting of the Association of American Portland Cement Manufacturers was held, to see the concrete roads of Wayne County. County Road Commissioner Hines went to Chicago and made the trip to Detroit with the party. The delegation was met by a committee of the Detroit Board of Commerce and in automobiles was taken on a tour of the roads which are the pride of that section of the country. Logan Waller Page, director of the United States Office of Public Roads and president of the American Association for Highway Improvement, was with the party and he said that the Wayne county roads give an indication of durability and of care in construction which impressed him most favorably. He said that in concrete roads is to be found the solution of the difficulty in providing proper avenues for the heavy motor truck traffic which is to become such a big factor in transportation in the next decade. He advocated the construction of concrete roads between cities to help solve the traffic difficulties. There was not a member of the visiting part in Detroit who was not most favorably impressed by the Wayne county roads.

Government figures show a big falling off in the imports to this country of Portland cement, and a marked increase in export trade. The imports in 1907 amounted to 1,123,763,604 pounds and in 1911 had fallen to 93,297,749 pounds. The exports in 1900 amounted to 76,085 barrels (of 380 pounds) and in 1911 to 2,971,474 barrels. The early months of this year show a further marked increase.

Cement Products Exhibition Company Holds Annual Meeting

The annual meeting of the stockholders of the Cement Products Exhibition Co. was held at the offices of the company, 72 West Adams Street, Chicago, May 14. The routine business transacted consisted of the reading of the report of the treasurer and the election of new directors and officers. The treasurer's report showed that the expenses of conducting the New York, Chicago and Kansas City Cement Shows were \$77,789.28, while the total receipts were \$78,729.52, leaving a surplus on the year's operations of \$940.24. By vote of the directors, it was decided to expend this surplus on future Cement Shows. Directors for the ensuing year were elected as follows: Edward M. Hagar, president Universal Portland Cement Co.; Norman D. Fraser, president Chicago Portland Cement Co.; D. McCool, president Newaygo Portland Cement Co.; J. W. Shove, secretary Peninsular Portland Cement Co.; W. E. Cobean, sales manager Wolverine Portland Cement Co.; B. F. Affleck, general sales agent Universal Portland Cement Co.; George S. Bartlett, Universal Portland Cement Co.; J. P. Beck, manager publicity bureau Universal Portland Cement Co. These elected the following officers: President, Edward M. Hagar; vice-president, B. F. Affleck; secretary-treasurer, J. P. Beck. Sentiments were expressed by the directors favoring the continuance of the cement shows, the feeling being unanimous that the cement exhibitions which have been held in the past have contributed a great deal to the advancement of the industry in advertising cement, cement products and cement machinery, and increasing the use of concrete. It was decided to hold the sixth annual Chicago Cement Show in the Coliseum January 16-23, 1913, but to hold no shows in New York and Kansas City. It is possible that another exhibition will be held at some other point, although nothing was definitely decided upon.

A departure in the cement industry developed this month when the Atlas Transportation Co. started on its first trip up the Mississippi a steamer and five large barges loaded with Atlas Portland cement from the Hannibal, Mo., plant. This boat line will run up the river as far as St. Paul, and down the river to New Orleans, and have connecting lines for both the Ohio and Missouri rivers. The steamer Josh Cook will tow a string of barges, leaving one at each distributing point on the way up or down the river. Atlas dealers will get their supply direct from these barges, and the steamer will pick up the empty barges on her return trip to Hannibal, where they will immediately re-fill.

If you have a copy of the December, 1911, issue of CONCRETE to spare, write The Concrete Publishing Co., Detroit, Mich.



The concrete brick house shown in the illustration was built at Watertown, S. D., for B. H. Stover, by the Stover Construction Co., at a cost of \$7,000. The foundation is of poured concrete to the water table. The steps and the trim are of cast stone. A garage floor and basement floor are of concrete. The interior construction of the house is of frame and the building is modern in every respect. The concrete brick were made by the Stover Construction Co. on a Helm press, one part Universal cement to four parts screened sand. The cast stone was made by the same company in sand molds under the Stevens patent. These pieces are one part cement, one part marble dust and two parts screened sand.



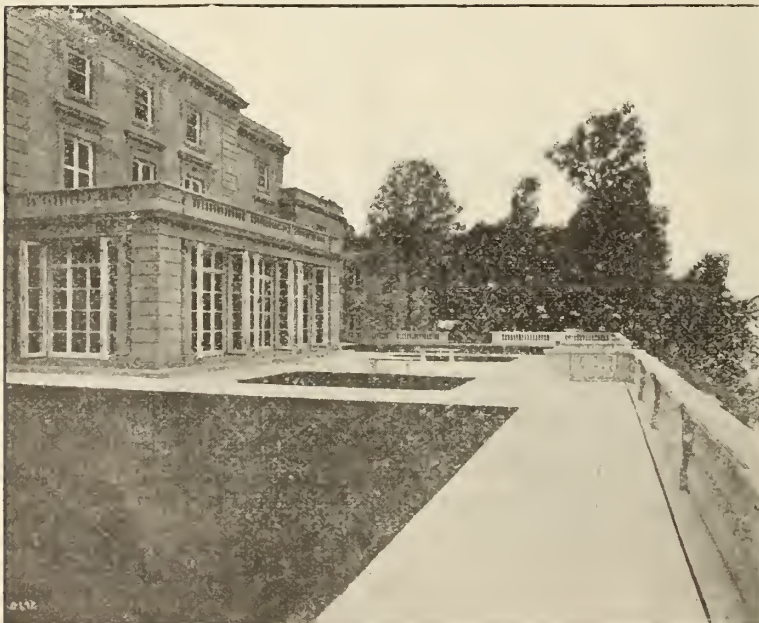
Residence of J. Y. Reid, Winnipeg, Manitoba, built with 12" block foundation and 8" block walls, made by the Perfection Concrete Co., Ltd., Winnipeg, on a Perfection press.



Concrete block cottage built at Wahoo, Nebraska, by W. N. Daugherty



House built and owned by Howard K. Bell, Lexington, Ky. The foundation is of poured concrete 15" thick with a 12" water table. The upper wall is 10" thick. This wall is made of three sizes of Hercules block—one 12" high by 20" long, another 8" high by 20" long and one 4" high by 10" long. The block are faced with a mixture of one part cement to two parts white sand which cost \$6 per ton; the back of the block is made of a mixture of one part cement, three parts sand, two parts gravel and 1" crushed stone. The porch floors are of reinforced concrete 5" thick. The lintels are reinforced with steel rods. The cost of the house complete was \$5,000 and the builder believes he could duplicate it for \$4,500.



Home of Benjamin Allen, Winnetka, Illinois; landscape treatment designed by Robert Knox, Chicago. All fences, settees, walks, etc., of concrete. Universal Portland cement used.

George B. Pulfer has retired as general manager of the Ideal Concrete Machinery Co., South Bend, Ind., to become vice-president and general manager of the Enamel Concrete Co., Des Moines, Ia., an organization which manufactures machines to make concrete brick with enamel faces. Mr. Pulfer went to South Bend, January 1, 1906, from Detroit, Mich., where for 16 years he was with the Acme White Lead & Color Works. Before his departure for Des Moines he was the guest of honor at a dinner given by business associates and friends who paid tribute to him for the place he has filled in the business affairs of the city. Mr. Pulfer remains a heavy stockholder in the Ideal company and continues as vice-president and as a director.

Modern Concrete Products Manufacture*

The Development of An Important Industry With Better Machinery, Methods and Profits

BY ROBERT F. HAVLIK, M. E.†

The concrete products industry is but in its infancy, and I am of the firm belief that in the not far distant future, factory-made concrete products will be used more extensively than any other one building material. As evidence of this, we need but consider the great strides made in the improved quality and increased use of concrete building block, trim, brick, drain and sewer tile and concrete roofing.

All such products, because made of Portland cement, increase in strength with age, something which cannot be said of any other building material. They resist fire, and with proper care can be made waterproof. Concrete block and ornamental trim can be given any surface treatment desired and at a reasonable cost. The hollow spaces in concrete block keep the structure at a more uniform temperature, thus making it warmer in winter and cooler in summer than is possible in the ordinary brick or frame building.

A very popular use to which concrete is put is in what is commonly called stucco. It is usually applied to frame buildings on either wood or metal lath. A permanent job is obtained and the walls made fireproof when the main structure is of hollow concrete building block, the outer surfaces of which are made especially for the application of stucco. While such a structure is higher in first cost than a frame stucco building, it is permanent and in the end is cheaper than the frame-stucco building.

Concrete drain tile, and likewise concrete sewer pipe, are being used in preference to other products. Everywhere one can see large sewers built of reinforced concrete pipe. This is convincing evidence that concrete is well qualified for this work.

Concrete roofing tile is being used in various shapes and forms. Concrete is peculiarly adapted for this use, because it is fireproof, waterproof, and becomes stronger with exposure to the elements.

All over this country, concrete trim, often called "art stone," is being used extensively in place of cut stone and terra cotta. Architects are specifying it. Its future is assured beyond all doubt.

As concrete building block are made by the same process, it requires no stretch of imagination to foresee a splendid future for this product. The block can be used advantageously with the concrete trim. The mere fact that these products are made in small units, permitting close inspection, so that

inferior or defective units may be rejected, will redound to the advantage of the material.

Several years ago, nearly all good concrete trim was made by the cast process, but in the last few years this has been made by the molded process. The principal reason for this is the difference in cost, and as this is always a prime consideration when the quality is the same, the molded process is destined to displace the other almost entirely. However, regardless of how the product is made, all that has been said applies to all concrete products, no matter by which process.

PROCESSES OF MANUFACTURE

There are two distinct processes of manufacturing concrete products, one the wet or cast process, and the other the molded, or semi-wet process. In the first, the concrete is made wet enough to be poured readily but not so thin as to cause segregation of the materials. The concrete is poured into sand, gelatin or iron molds. In the second process, the concrete should be made so wet that when trowelled a little, it will show slight moisture under the trowel. In this case, the concrete is pressed or tamped into iron, wood or plaster molds, and the molds are usually removed immediately after the product is made. The first process tends to cause hair cracks and checks in the work. When the product is cast in sand molds, the work is expensive as the mold frequently can be used to produce only one piece, whereas in the semi-wet process, the mold is used over and over again. Regardless of what can be said of either process, the semi-wet process is bound to be used in preference to the other in most cases, not because the cast concrete is not so good as the molded concrete, but because the latter is as good as the cast concrete, and can be produced at a much lower cost. Where one piece of work is produced by the cast process, there are probably ten to twenty jobs executed by the molded process. Regardless of the causes, the fact remains that the modern tendency is to produce more molded concrete products in preference to cast products.

MACHINERY

There are two types of machines on the market for producing concrete products by the molded process. In the one, the concrete is pressed into the mold box, whereas in the other, the concrete is tamped into the mold box. Much has been said about the amount of water that can be used in the concrete with the two types of machines. The facts of the case are that as much water should be used in either machine as will allow the product to retain its shape after it has been removed from the machine. It is apparent, therefore, that the amount of

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo.

†Formerly engineer Ideal Concrete Machinery Co., South Bend, Ind.; now establishing a plant for the manufacture of concrete products in Detroit, Mich.

additional amount of cement does not materially increase the cost of the product. However, if the manufacturer can afford it, he should put in the proper bins, with elevating and screening machinery, as he will then be sure of a uniform product, and will not have to test his aggregates constantly to determine the quantity of cement he needs.

There are three principal methods in vogue for determining the proper proportions of each aggregate that should be used. The first is the "void" method; the second, proportioning by trial mixtures; the third, proportioning by the study of mechanical analyses of the various aggregates. The first is universally acknowledged to be a little better than a guess. The second is a very good method to determine the best proportions to use of the various aggregates just as they are. The third method, however, quickly shows the same result, and also the quantity of any size aggregate required to produce the best concrete.

In the third method, the aggregates are screened through screens of various sizes, and the percentages by weight of the materials passing screens of certain meshes are carefully recorded. For any given amount of cement, the strongest concrete is produced from that combination of aggregates the mechanical analysis of which, when plotted to a curve by the coördinate method forms a parabola, passing through the zero ordinates and the intersection of the diameter representing the largest stone with the 100 per cent ordinate. This method was discovered by William B. Fuller in 1901, and is discussed in detail by him in a special chapter in Taylor and Thompson's *Concrete, Plain and Reinforced*. The percentage by weight of the aggregate smaller than a given size can be easily calculated by the formula for the parabola. $d = \frac{P^2 D}{10,000}$

or $P = 100 \sqrt{\frac{d}{D}}$ —in which P=percentage of mixture smaller than any given diameter; d=any given diameter; D=largest diameter of stone used.

Table 1 gives the percentages by weight that are required of any size aggregate to form an ideal mixture.*

As a rule, concrete aggregates have too much fine material, and if the aggregates are screened and graded, there is a surplus of the fine material which must be disposed of in some manner, as it keeps accumulating, and this feature should be given careful consideration in designing a grading plant.

MIXING

When the selection of the aggregates is properly taken care of, the next important consideration is

*This discussion of grading aggregates was covered quite fully in Mr. Havlik's paper on *Modern Methods in Concrete Block Making and Use*, published in the April, 1911, issue of CONCRETE. This material and other material in the present article which were covered in the previous paper are included here, because they have to do with questions of fundamental importance in concrete products manufacture and the paper would not be complete without them.—Editors.

that of properly mixing the concrete. The superiority of machine mixing over hand mixing is an accepted fact, and needs no argument. Mixers should be used by all means, and none but power machines, as hand mixers are man-killers, as anyone can testify who has used them.

At present there are two types of mixers on the market; the batch and the continuous, self-proportioning machines. As both types are well known, they need no further description. At our last convention, held in New York city, there was considerable discussion of the variation caused in the mixture by the moisture in the sand. It was there recommended that the materials should be proportioned accurately by the use of measuring-boxes, chutes, or some such device. The inference was made that proportioning mixers do not do this. I know that the general impression gathered was that if the materials were measured in some such way as this and mixed in a batch mixer, the results would be almost perfect. However, I do not think it was the intention of the speaker to create this impression.

There are a lot of people, however, who believe that this is true. Frankly, I do not agree with them, and I propose to show that a good continuous mixer will handle wet materials just as well as a batch mixer, and that neither one of the two is ideal. Practically all continuous proportioning mixers measure the materials, as was suggested at the last convention. The only difference is that a continuous mixer measures the materials in smaller quantities than is done with a batch mixer.

The only danger to contend with in a continuous mixer is that wet materials may arch and not feed properly, but this is not due to a mistake in the principle of the machine, but rather in the design. The sides of the hopper must be steep, and the bottom large enough so that the materials cannot arch, and these features should be looked into carefully when purchasing a machine of this type.

It was also brought up at the last convention that moisture in sand materially affects its volume. No one who knows anything at all about concrete will dispute this fact, but I contend that the moisture affects a large batch just as much as a small batch, and therefore a large batch of wet sand will affect the resulting concrete when mixed in a batch mixer just as much as a small amount will affect the concrete mixed in a continuous mixer. It is evident, therefore, that whether the materials are mixed in a continuous or batch mixer, they are as likely to be affected by the moisture in the sand as much in one machine as in the other. I admit that neither is perfect, but I contend that the only way to get a perfect mix is to dry all the aggregates, and then either type of machine will handle them satisfactorily. It has often been suggested that the aggregates be weighed. There is no doubt that this can be done, but it cannot be done economically with any machines on the market today.

I have also heard it suggested that mechanical proportioners should be prohibited unless they pro-

portion by weight only. I would agree with this if the same were required of batch mixers, but were we to require this of both machines, we would have no machines on the market to fill the requirements.

In discussing this question with a tile manufacturer, he plainly stated that although he was using a batch mixer for his dry mixing, and a paddle conveyor for his wet mixing, that his mixtures would vary materially on account of the moisture, in fact, as much so as in a continuous mixer, and oftentimes, instead of getting a 1:3 mixture, he might get a 1:2 or 1:2½. This proves that neither type of machine does this work satisfactorily unless proper precautions are taken to correct the mixture for the moisture. If these precautions are taken, both types of machines will mix very satisfactorily.

All concrete products should meet certain strength requirements, and the proportion must be governed accordingly. It is immaterial whether the proportions are 1:3:5, 1:2:3, or anything else, providing the products made from these proportions of cement and aggregate meet the strength requirements.

FACING AND SURFACE TREATMENTS

Nearly all concrete block and other products such as brick and trim are faced with a rich mixture of cement and sand. As such products are sold on their appearance, it is essential that the face be very hard, and all corners and edges solid. The usual proportions used in the facing vary from 1 part of cement to 1½ or 3 parts of aggregate. When ordinary sand is used, it should be graded from ⅛" down to a No. 50 mesh, with no material smaller than No. 100 mesh. In white facing, the proportions must be at least 1 part of cement to 1½ or 2 parts of aggregate, as all available white aggregates are either all one size, as the case of white sand, or contain too much dust, as is the case with most crushed white marble.

The manufacturer can readily obtain any surface effect desired. If he wishes to color his block or other products, he can do so by using mineral colors. Should he wish to expose the aggregate used in the facing, he can do so by scrubbing the face of the product with acid and water after it has set for 24 or 48 hours, or by spraying it with a fine spray of water just as soon as it is made.

Many architects have desired a polished concrete product. Concrete block can be polished so that they will have a face closely resembling terrazzo. The facing mixture used is practically the same as that used in terrazzo floors, and when the product has hardened sufficiently, it can be polished with polishing machines or by hand. Hand polishing, however, makes the cost prohibitive, and even with polishing machines, the cost is more than the average user cares to pay, and for that reason, polished concrete products will not be used extensively until cheaper methods of polishing have been discovered.

For many years, concrete building block have been condemned on account of the so-called rock face. This style of block has probably hurt the

business more than anything else, and as the tendency today is toward the use of other designs, we should no longer condemn the product on this account, but rather promote its use by praising where praise is due, and certainly the vertically and horizontally tooled, bush hammered and plain types of block deserve favorable comment.

The concrete building block is here to stay, and no amount of adverse criticism will prevent its use; so it behooves us to improve the industry by suggesting improved methods of manufacture.

CURING

Concrete products are cured usually by either of two methods; the more common method is to sprinkle the block with water as often as necessary to keep them moist constantly for a period of about ten days, after which they are stored in the yard and allowed to cure naturally; the second method is to expose them to steam saturated atmosphere at atmospheric pressure, and allow them to cure thus for forty-eight hours, after which they are stored in the yard until used.

The modern and best method is the second, as block so cured can be readily handled the third day after they are made without danger of damaging the edges or corners, and they can be used much earlier in a building than if cured by sprinkling.

Extensive tests with high pressure steam show that the strength of a concrete product will be materially increased by curing it in an atmosphere of high pressure, saturated steam, similar to that used in curing sand lime products. It is very probable that in the not far distant future, nearly all concrete products will be cured in this way. Block so cured are ready for the market in 48 hours, and a material saving in cement can be effected. The first cost of such a plant, however, is quite high and beyond the means of the ordinary concrete products manufacturer.

The modern tendency, however, is to centralize this industry and manufacture concrete products on a large scale, which of itself will bring this condition to pass. There is no danger from too high a temperature in curing, providing the steam is saturated. A simple fact little understood by the user of concrete is that steam in the presence of water is always saturated regardless of the pressure. As soon as it is drawn from the boiler, it commences to lose heat, the temperature is lowered, and consequently the steam loses moisture in the form of condensation. In a steam curing plant, the steam is taken directly from the boiler and fed into the kiln. The kiln is not heated by external means, and therefore is always at a lower temperature than the steam at the boiler, consequently the steam loses heat as soon as it enters the kiln, and condensation takes place. It cannot under any condition extract moisture from the block or other products unless a fire should be built under the kiln and the kiln heated to raise the temperature above that of the steam in the boiler.

This is one of the first principles of steam engineering, and it is wrong to state that the temperature of the steam curing kiln must not be over 100° or so Fahr. Instead of maintaining the temperature of the curing

kilns at this point, it should be raised as much as possible by the steam itself as fed from the boiler, and the resulting product will be far stronger. The feeding of the steam through a pipe which is immersed in water is unnecessary, although I admit that in my first tests, I did this very thing, but more because it was pointed out to me that unless these precautions were taken, the product would go to pieces. The best plants today feed the steam direct into the kiln, without immersing the feed pipes in a trough filled with water. There is no harm in this method, but it is altogether unnecessary.

No concrete products manufacturer should cure his product by sprinkling unless he positively cannot afford to put in a steam curing plant, as the latter is the only up-to-date method.

WATERPROOFING

In speaking of waterproofing, I tread on dangerous ground. Regardless of what can be said of monolithic concrete, I am of the firm belief that concrete building products such as block and trim should all be waterproof, so they will absorb little or no water. It has been contended frequently that they can be made waterproof without the use of a waterproofing. I have had considerable experience along this line, but have failed to make a waterproof block without the use of a waterproofing, regardless of how wet I made the facing. I contend that concrete building products should dry in a few hours after a severe rain, and no product made without a waterproofing will do this.

I know that block can be made waterproof, without waterproofing, to such an extent that moisture would not affect the interior of the building, but that is not sufficient, for such block retain moisture in the face entirely too long. I personally would not live in a house made of concrete block which retained moisture in the face for two days or more after a severe rain. It is this very feature that creates the general impression that concrete products are not waterproof, and for that reason alone, if for no other, a reliable waterproofing should be used to prevent it.

The great majority of waterproofings now on the market are unreliable, but there are a few that are very good. Much of the adverse criticism of waterproofings is due to laboratory tests made on small specimens, perhaps 2" cubes. Such tests are unreliable, as I know from personal experience. I believe that with any waterproofing a sufficient amount of water must be used to show a little moisture on the surface of the product when made, or else it will not be waterproof. Another precaution that must be taken is to tamp the concrete very thoroughly. It is impossible to do this in small laboratory specimens, and that is why they seldom prove favorable to the waterproofing.*

I have had a lot of difficulty along this line myself. In making full-size block I never had any trouble

in producing a waterproof block when I observed the proper precautions, and yet in making quarter-size model block I had trouble until I learned to tamp the face very thoroughly. For that reason, I always lay great stress on this feature.

ARRANGEMENT OF PLANT

The arrangement of a concrete products plant should have very careful consideration. The main object should be to keep the cost of production as low as possible. To do this, it is necessary to handle the raw materials as well as the finished product, as economically as possible. The plant should be so laid out that screening apparatus can be installed at any time without seriously affecting the general layout of the plant. Overhead bins should be used if possible. These can be in the second story, so the mixer can be fed direct from the bins and the concrete fed from the second floor to the machines. If the bins are of large capacity, they will run up in height a great deal. Should this prove an objection, they can be placed so as to discharge on the first floor into an elevator which will elevate the material into the mixer on the second floor, and the discharge gates of the bins can be handled from the second floor by the man operating the mixer. The concrete is dumped into a dump car, which discharges into hoppers located above the machines. When it is impossible to use this arrangement, the mixer can be located on the first floor, and discharge into a portable dump bucket, which can be operated on an overhead rail. All of the machines and molds should be located on one side of the plant. The cars should be directly in front of the machines or molds. At Barberton Ohio,† the car tracks are set about 9" lower than the surrounding floor, so that the cars stand in pits, and the first deck is a few inches above the floor level.

This is an excellent method, as the block-maker is enabled to load the highest deck without straining himself. When the cars are loaded, they are run onto a transfer car, and then into the kilns. Two pits should be used for each machine, so that as soon as one car is loaded, the block-maker can commence loading the second car while the first is being run into the kiln.

When the blocks have been cured for two days, they should be stacked in the yard as conveniently as possible for loading onto wagons or railroad cars. No two plants can be designed alike unless the available ground space is approximately the same. For that reason, one can only offer suggestions as to the general scheme, and each plant should be figured out separately, making use of these principles so far as possible.

The steam curing kilns should have semi-circular ceilings so that the condensed steam will run down the sides of the kiln and thus not drip on the concrete

Tests of Damp-Proofing and Waterproofing Compounds and Materials, by Rudolph J. Wig and P. H. Bates. Acknowledgment is made of assistance given by Mr. Havlik, as follows: "Acknowledgment is also made to R. F. Havlik for his assistance in conducting the tests."—Editors.

†This plant was described in the December, 1911, issue of CONCRETE.

*This comment by Mr. Havlik on waterproofings and tests of waterproofings has a peculiar interest at this time. The Bureau of Standards of the United States Department of Commerce and Labor has recently published (Techologic Paper No. 3) *Tests of Absorptive and Permeable Properties of Portland Cement Mortars and Concretes, Together with*

products, as happens where flat ceilings are used. The best method of feeding the steam into the kiln is probably through a pipe along the floor in the center of the kiln, so that the steam may escape to the side of the kilns, rise upward, and circulate to the roof where the two streams meet and are forced downward again. Proper arrangement should be made for draining the condensed steam back to the boiler or to a pool.

BUILDING LAWS

All the large cities are adopting building laws governing the use of concrete products, and it behooves us to consider this question very carefully and draw up reasonable regulations which can be presented to the various building departments. Laws are certainly necessary for this purpose, but they should be uniform and fair to both the producer and user of the product. All hollow concrete building block should be required to have a minimum average crushing strength of 1,000 pounds per square inch of gross cross-sectional area of the block, and solid product 1,500 pounds per square inch, figuring on the same basis.

This will insure a uniformity of the product and the thicknesses of walls should then be figured accordingly, regardless of what is allowed for other building materials. For block laid up in a lime and Portland cement mortar, a load of 167 lbs. per square inch of gross area of the wall should be allowed, and when they are laid up in a Portland cement mortar, a loading of 200 lbs. per square inch will be safe. In both cases, the factor of safety will be at least five. On this basis, the thicknesses of walls of average buildings can be readily figured and recommended as standard. All other buildings not covered by this should be figured on the above basis. When the hollow spaces are filled in solid with concrete, and the block are laid in a Portland cement mortar, 300 lbs. per square inch can safely be allowed.

This phase of the concrete products industry is very important, and should have immediate attention by this Association. Concrete block manufacturers everywhere are asking for information on this subject, so they can present data to their local building authorities. Heretofore our regulations have been too general, and referred this matter to what is allowed for other building material. This I contend is radically wrong, for if we know the strength of the material, it should be figured on that basis only, and to refer it to other building materials implies that we do not know the strength of what we are producing.

Regulations of this kind should be adopted by all cities, but they should not be so severe as to kill the industry. If once adopted, however, it will place the concrete building block at an advantage over any other material, as others are not required to meet any test requirements, and therefore the walls are usually figured very heavy to guard against the poorest product that may be on the market.

COSTS AND PROFITS

The costs and profits of this business deserve careful attention. I believe the concrete products industry offers a better field for the investment of capital than most industries, for the reason that it is in its infancy,

and the demand for concrete products is increasing constantly, and because it has an unlimited field.

However, as in any other business, the production costs must be watched very carefully. The overhead expense must be watched even more so. A small firm cannot afford to have more than one salaried officer who is not actually producing the product. Too many plants have failed because every man interested therein desired an office, and a nice salary, and did little but sit at a desk and draw his salary. The actual productive cost is usually such as to admit of a very nice profit, if there is a volume of business, and the overhead expense is kept down.

Under overhead expense, everything should be included, such as salaries of officers, office expense, power, fuel, light, water, taxes, insurance, interest on investments and depreciation and any other items that cannot properly be classified as actual labor and materials cost of the finished product. This is never known in exact dollars and cents on any one product, but must be estimated as a percentage of the actual productive labor cost, and added thereto and to the cost of materials to arrive at the selling cost of the product. Anything over and above this that is obtained in the selling price will be the net profit on the product, and will not usually be 5c per block, as many manufacturers claim, but more likely, 3c or so. If the manufacturer does not draw a salary, he should figure that he is worth a certain salary per year, and regard this as a part of the overhead expense, and the balance of his profit will be a clear, net profit.

REQUISITES OF BUSINESS

No firm or individual should attempt to go into the concrete products business without a sufficient amount of capital to buy the necessary machinery, a stock of cement, sand and gravel, and a surplus to do business with. The exact amount required depends on local conditions and the extent to which they intend manufacturing concrete products, but in no case should it be less than \$1,500 to \$2,000 if the individual desires to make sure that he can stay in the business long enough to get a firm footing. No one can go into this extensively without a capital of \$6,000 to \$10,000, and in that case should merely rent or lease the ground on which the plant is located, or buy it on a long time mortgage.

The actual amount of capital that is necessary for machinery is not excessive, but the surplus with which to do business should exceed the actual money put into machinery and materials. My advice either to an individual or to a firm would be to lay plans for a large plant, and then put in only what is absolutely necessary at the start, but arrange the building and machinery in such a way that additions can be made without affecting the existing plant. In this way, no capital will be wasted. The machinery purchased should amply supply all immediate needs, but too much should not be purchased at the start. After the business has been started and the manufacturer is familiar with the market, he can add to his equipment such other machinery as he needs.

Every firm should have the services of at least one man who thoroughly understands all phases of the con-

crete products business. This man should have a knowledge of plans, and should be able to figure the actual labor and materials cost of each product. Such a man should also be able to handle men so as to get the maximum production in his plant. There is a big profit in this business, if properly conducted, and in almost all localities one can feel sure of a reasonable profit, if the business is conducted with the same care that is put into any other enterprise. There are firms in this business today which are making as high as \$15,000 clear profit per year. Others are making from \$1,000 to \$5,000 clear profit per year. I know of instances where men have gone into the concrete products business with about \$200, and in three years were worth over \$8,000, and yet these men were ordinary individuals who in many cases had never been in any business before engaging in this industry.

Look at this as you will; the concrete products industry is here to stay, has a splendid future ahead of it, and offers to enterprising men an excellent field for investment.

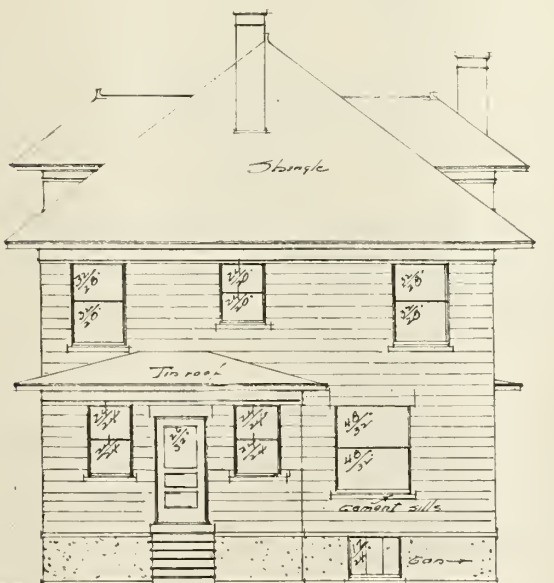
Working Drawings for House of Concrete Block to Cost \$3,200

Working drawings for another square type of home in concrete block construction, are shown this month. The construction to the water table three feet above the grade is monolithic with a rough-cast finish.

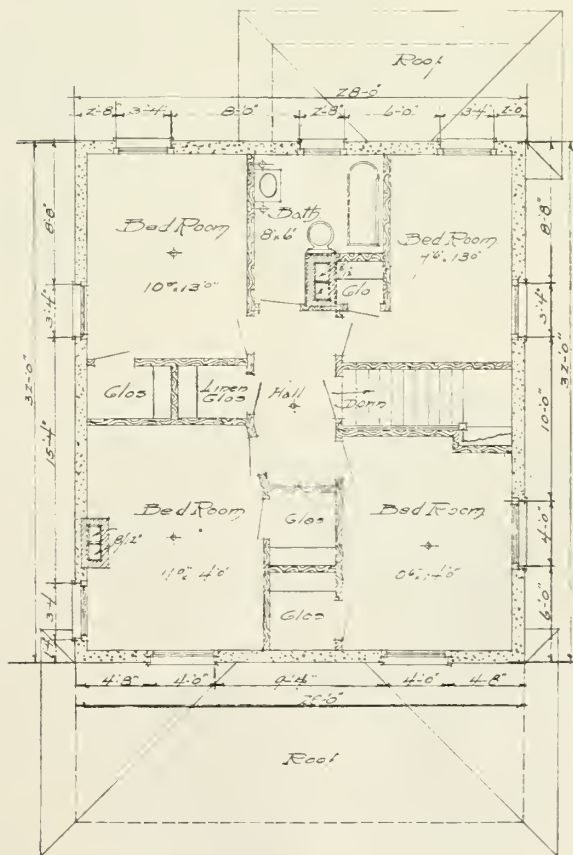
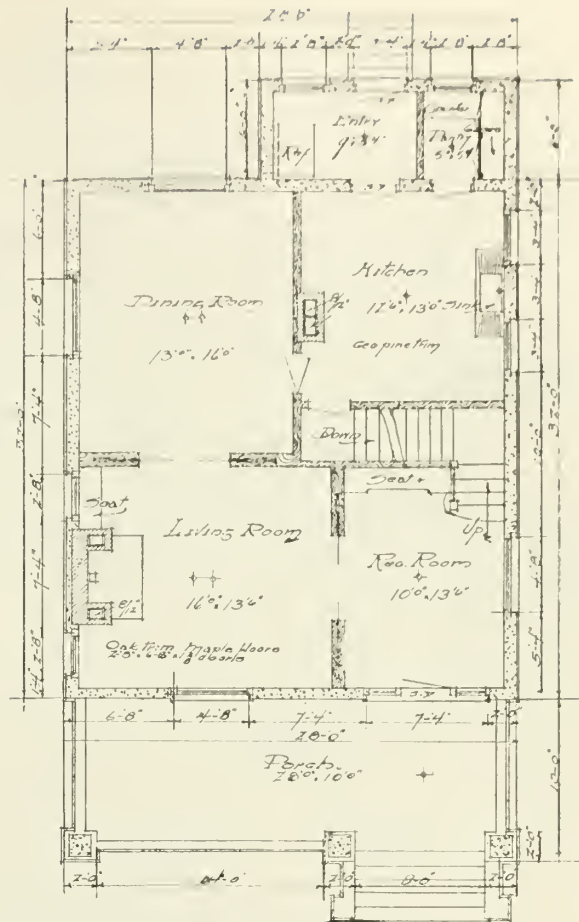
Notwithstanding the fact that there is a tendency toward other than the square Colonial homes, they are very popular, and are the most economical. The square house has only four corners, and the rooms in a square house can always be better laid out than in any other shape of plan, particularly the moderate priced homes.

This house is 28' wide by 32' deep in the main portion, with a rear entrance and pantry extending 6' beyond. The porch which extends entirely across the

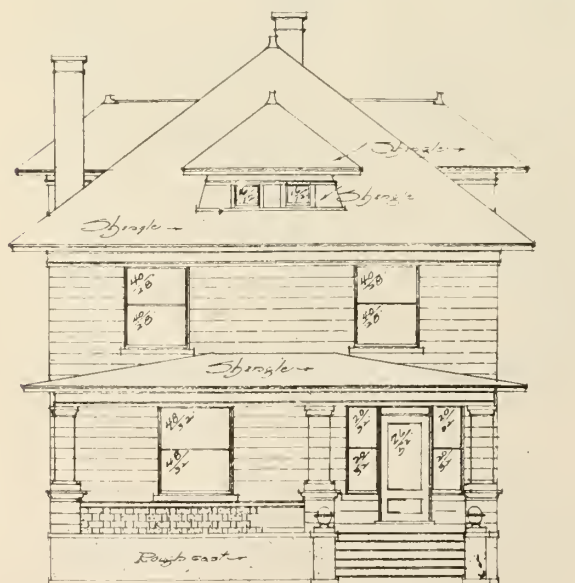
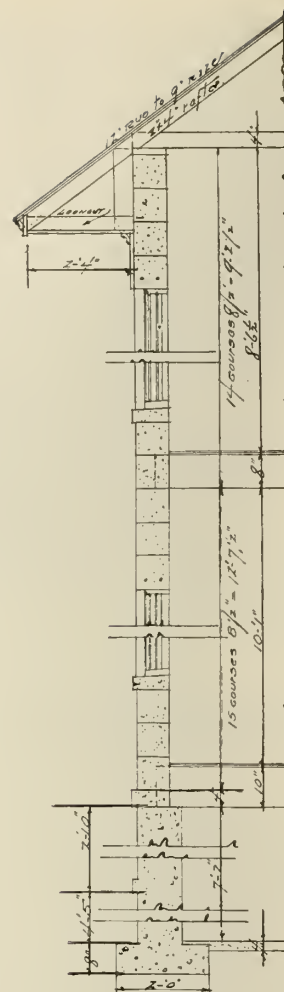
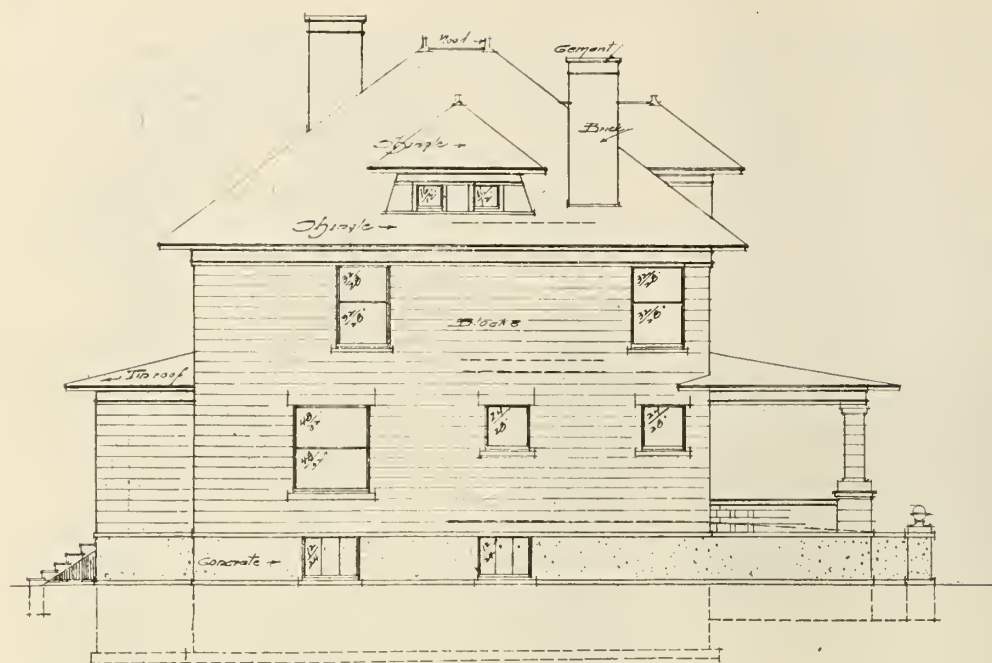
(Continued on page 41)



Front Elevation—Scale 1/12" to 1'



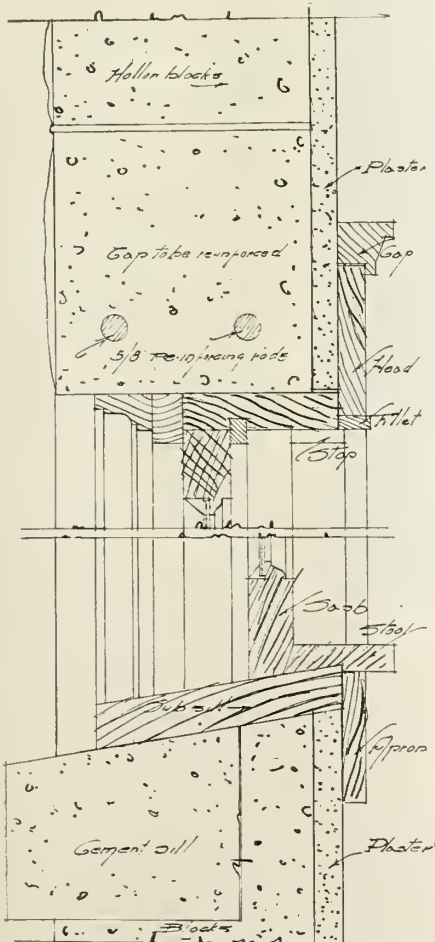
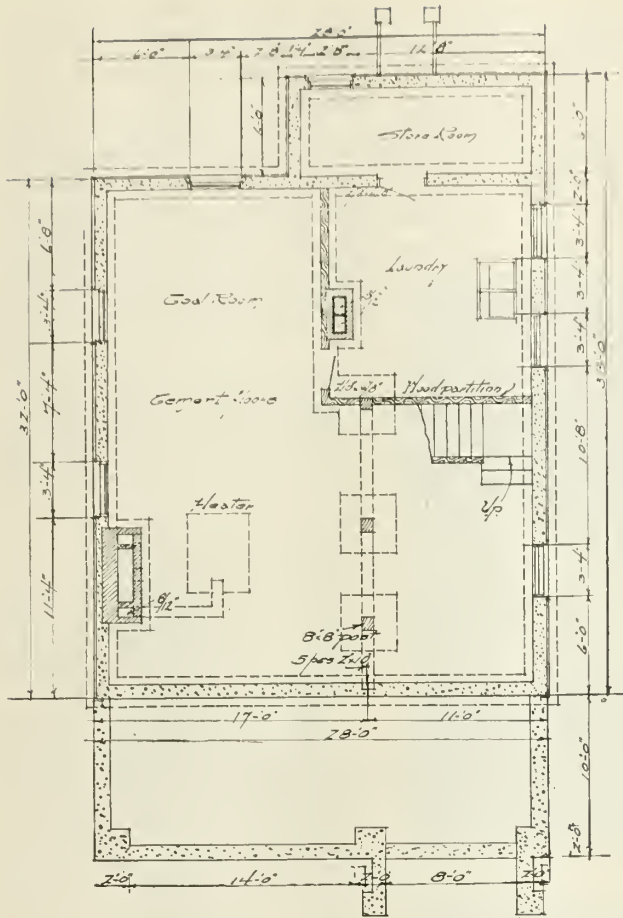
First and Second Floor Plans—Scale 1/12" to 1'



Side and Rear Elevations Concrete Block House, Scale 1-12" to 1' and Wall Section Scale 1-4" to 1'.

On the opposite page, Basement Plan, Scale 1-12" to 1' and Frame Detail, Scale 2" to 1'.

(Continued from page 39)



front of the house is 10' wide, has a concrete floor, concrete balusters and railings.

The use of concrete balusters and porch railings is an economy over wooden construction, which costs just as much in the first place, and has to be painted every two or three years.

The floor plans are well arranged and convenient. The reception hall is 10' x 13', and the stairway goes from this reception hall to the second floor. The living room is 16' x 13'6", and has a cozy fire place opposite the reception room. Back of the living room and separated from it by sliding doors is the dining room 13' x 16'. The kitchen is 12'6" x 13'. Entrance to the basement is from the kitchen, and connected also with the rear entry way or refrigerator room and to the pantry in which are counters, bins, cases, doors and cupboards.

On the second floor are four good bed rooms, each with a separate closet, and a good big linen closet off the hall, and a convenient bath room.

Concrete block, 8" x 8" x 16" in size, are used for the walls above the water table. Trim in the main rooms is oak, with Georgia pine for the kitchen and second floor all to be stained and varnished.

The cost of this house is estimated as follows:

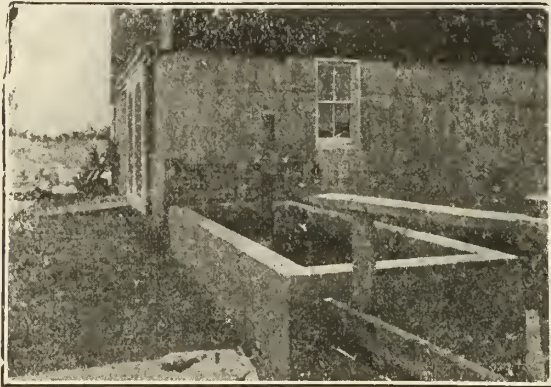
Excavating	\$ 40
Concrete and block work.....	960
Carpentry, frames and rough lumber.....	640
Interior finish, doors and sash.....	400
Painting and varnishing.....	180
Electric wiring and fixtures.....	70
Plastering	240
Hardware	60
Fire place and brick work.....	160
Tin and sheet metal work.....	50
	\$2,800
Plumbing	\$240
Hot air heating.....	160
	\$3,200

Moving picture films showing concrete roads in Wayne County, Michigan, and contrasting unimproved roads with roads that have been improved with concrete, have been made by the Universal Portland Cement Co. The films also show the complete process of construction. Motion pictures have also been taken of concrete road work in other parts of the country. Wherever good roads meetings are held or wherever any street or road improvement proposition is under consideration, the Universal company is prepared to make a display of its motion picture films to prove the serviceability and economy of concrete paving.

Best Bros. Keene's Cement Co. announces the death of its general sales manager, Roger Titus, Saturday, April 20, Cleveland, Ohio.

How to Build a Durable Watering Tank of Concrete*

Many farmers and stockmen want to know how to build their own concrete watering tanks and troughs. The method is easy and a tank is not expensive. To explain the plan, a horse and cattle tank is described below which holds 30 barrels of 31½ gallons each. If desired, smaller or larger troughs, round or square, may be built in exactly the same manner. Such tanks, well made, never crack, wear out or cause mudholes.



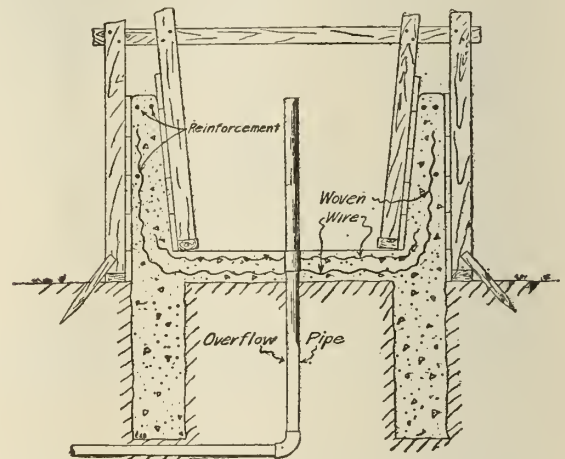
Concrete Tank with Removable Tank Heater

To build an oblong tank like the one shown in the picture, mark out the ground plan 5' x 14'. Within these lines scrape away all trash and dig a foundation trench 10" wide and 2'6" deep around the entire tank. Lay all in-flow and over-flow pipes (not less than 1½" in diameter) so that the ends, fitted for connections, will be even with the finished bottom of the tank.

Before digging the foundation trench, build the forms and have all materials on hand. For forms use 1" siding on 2" x 4" uprights spaced 2' apart. The outside form is a bottomless box 5' wide by 14' long, inside measurements. Make it 3' high to provide for a 6" floor and a clear depth of 2'5". The inside form must be narrower and shorter to make provision for walls 5" thick at the top and flaring to a thickness of 8" at the bottom of the tank. When ice forms, this slope allows it to slip up the tank walls instead of pushing directly against them. The sides and ends of the forms may be made separate and put together in place; or, if there is sufficient help, each form may be entirely completed and set up as one piece. The forms are held in position by 2" x 4" liners at top and bottom and, if necessary, by sloping braces nailed to stakes driven in the ground. Cut strips of heavy woven wire fencing long enough to cover the bottom of the tank crosswise and to project up into the walls to within 6" of the top, and likewise a strip 4' longer than the inside length of the tank.

With the forms ready, mix the concrete 1 part Portland cement to 2 parts sand to 4 parts crushed

rock. In measuring the materials, count 1 bag of cement equal to 1 cubic foot. If bank run gravel is used, mix the concrete 1 part cement to 4 parts gravel. Fill the foundation trench with concrete. Set the outside form in place. See that it is level, so that the tank will be level and can be entirely filled with water. Lay the 6" bottom reinforced 1½" from the under side with the short lengths of woven wire crosswise and 1½" from the upper side with the long strip of fencing. Bring up the extra length of wire so that the ends will project up into the future side walls and can be fastened to the reinforcing rods. This wire reinforcing in the bottom will prevent possible cracking due to heaving by frost. Finish the surface of the bottom the same as for a sidewalk. Do not let concrete get into the in-flow and over-flow pipes.



Cross-section Showing Forms and Tank with Reinforcement

With the bottom finished, immediately set the inside form in place and fill the wall space with concrete mushy wet. Half-way up the side, and 1 inch from the outside, lay a ⅜" rod (or several hooked together) entirely around the tank. Again 2" from the top and 1" from both inside and outside, embed two more ⅜" rods in the concrete. Round the top edges of the tank with a trowel or a sidewalk tool. If a tank cover is desired, insert ½" bolts, heads down, in the soft concrete with sufficient length above the top of the wall to pass through the wooden cover and to receive a nut and washer.

When the tank is three days old, remove the inner form and paint the inside of the tank with a mixture of cement and water as thick as cream. Screw into the over-flow connection the necessary length of over-flow pipe. The tank may be used in ten days provided the outside form is left in place. If the outer form is removed at the same time as the inner, do not use the tank for two weeks.

BILL OF MATERIALS

Crushed Rock	6½ cu. yds. @ \$1.10.....	\$ 7.15
Sand	3¼ cu. yds. @ 1.00.....	3.25
Portland cement.....	10½ barrels @ 2.50.....	26.25
12 Rods.....	⅜" x 10', 45 lbs. @ 0.02¼.....	1.00
Total.....		\$37.65

By getting prices from local dealers, the cost may be found to be less. Such a tank is by far the cheapest to be had, since it never needs repairs and never wears out.

*Courtesy American Association Portland Cement Manufacturers.

Successful Concrete Paving in Montesano, Washington Shows Way to Others

A conservative estimate of the number of square yards of concrete pavement laid in the United States in 1911 places the total at about 2,000,000. The 1911 yardage laid is four or five times as great as that laid in 1910. Such an increase can indicate but one thing—the satisfaction that is given by this type of construction.

The pavement is laid at a cost of from \$1.00 to \$1.50 per square yard, the price varying with base conditions. Such a low maintenance cost for concrete always appeals to taxpayers. In Wayne County, Mich., where there are thirty-three miles of concrete road, the annual maintenance expenditure in 1911 was only \$200—approximately \$6.00 per mile—and this sum was spent largely upon gravel shoulders and ditches.

Montesano, Wash., has some concrete street pavement that has attracted attention all over the state, and created a big demand for concrete in the vicinity. Property owners and engineers are enthusiastic over the success of the work. Geo. W. Gauntlett, city engineer of Montesano, writes as follows:

"I have received a great many letters from engineers and property owners in this state and in Oregon asking for data. These, I have been glad to answer, as I feel it is helping in a way to give the people a better pavement at half the cost. The city engineers of our county (Chelan) have become interested in this type of pavement for highways. They know that the cost of maintenance of gravel roads for eight or ten years would build a concrete road sixteen to eighteen feet wide, and this, well constructed, should last for twenty-five to thirty years under heavy traffic.

"County commissioners of an adjoining county have let the contract for about six miles of concrete paving on a much traveled roadway. The City of Aberdeen, Wash., is placing several blocks of concrete pavement. Both of these jobs are nearly the same as the Spruce street job in Montesano. The city engineer of Cosmopolis has been instructed to draw plans for a pavement similar to ours and

was sent up to investigate it. He stated that he was well pleased with the pavement and would recommend it to the council."

Mr. Gauntlett says: "An ideal pavement should be easily cleaned and sanitary, durable, of low maintenance cost, noiseless, easy on horse and tire travel, one on which water and oils have no bad effect and within the reach of the people financially."



Spruce Street, Montesano, Washington, Looking East from Church street. Photo taken in October, 1911



Finished Street After Six Months Wear Shows No Sign of Abrasion and is as far as the Eye can see as Good as When Finished

Taking all these points into consideration a properly constructed concrete pavement will come the nearest to the ideal.

A concrete pavement can be easily cleaned with flusher or broom without damage and is sanitary beyond question. For durability we have favorable reports from cities of all classes in the United States. These reports, covering a period of eighteen years, all commend its durability and low maintenance cost. Maintenance is in fact, practically nothing.

and if repairs are needed, the materials are always on hand and no expert labor required. As to noise, it excels in cold weather many other materials. Teamsters' unions have endorsed it without exception for its desirability for their business. Automobile owners and drivers are enthusiastic in their praise of its non-skidding finish and even surface. Autos can not destroy it and their oils have no

ing a great deal of traffic, both horse-drawn and auto. This pavement has been down a year, and although the narrowness forces the wagons to follow the same track, there are no perceptible signs of wear.

The subgrade was prepared in the usual manner. Combined curb and gutter were next laid in sections, a $\frac{5}{8}$ " expansion joint cutting entirely through the curb and gutter every twenty-five feet. The gutter in this case is 18" wide and 6" thick, composed of a 4" base and a 2" top of the same materials and proportions as the street pavement, except the facing of the curb, in which a finer grade of sand was used. The base of the gutter and the entire curb was placed at the same time, setting as a unit mass. The top course of the gutter was added as soon as the curb had become sufficiently set to allow the removal of the facing board.

When the gutter had become sufficiently set, the pavement was laid. The first subgrade template was used 6" below the finished grade. A concrete base was then laid 4" thick, composed of one part cement, three parts sand and six parts gravel. All sand used in the pavement proper was such as would pass through a number three screen. This was leveled with a base template $1\frac{3}{4}$ " below the finished grade, allowing $\frac{1}{4}$ " for tamping, which immediately followed. The base being wetter than the ordinary sidewalk base, the shrinkage was less. After a section twenty-five feet in length had been laid, expansion joints of $\frac{5}{8}$ " steel cut to the crown of the street, were placed corresponding in line to the expansion joints in the combined curb and gutter. The wearing course was then laid composed of one part cement to two parts sand and pea-gravel, mixed wet

enough to pour. This was gone over with a finish template. It was then carefully floated. On account of the thickness of the wearing surface, it was carefully worked. It was then given a smooth trowel finish and immediately broomed. This method was rather unusual, the brush being applied by tapping the surface gently, without disturbing the initial set.

When the pavement was sufficiently set the expansion joints were removed. The joints were then



Spruce Street, Looking East from Sylvia; Combined Curb and Gutter and Sidewalks in Place; Finishing Grade for Pavement



Finishing Intersection of Spruce and First Streets

effect on it. As for cost, it is still in a class by itself.

In the spring and summer of 1911, 8,000 square yards of this pavement were laid in Montesano, 2,000 square yards of which were laid in the alleys of the business section, and 6,000 square yards on one of the principal residence streets. This street was an arterial highway connecting with the main county road, running through the county and hav-

filled with oakum or burlap and left until the pavement was entirely set. They were then filled with hot asphalt.

The cost of this pavement as laid in the alleys in Montezano was \$1.27 per square yard 6" thick, and as laid in the streets \$1.30 per square yard 6" thick. Concrete curb costs 27c per linear foot. The gutter was paid for as pavement. Screened river sand and gravel on the job cost \$1.50 per cubic yard. Labor cost from \$2.00 to \$3.00 per eight hours.

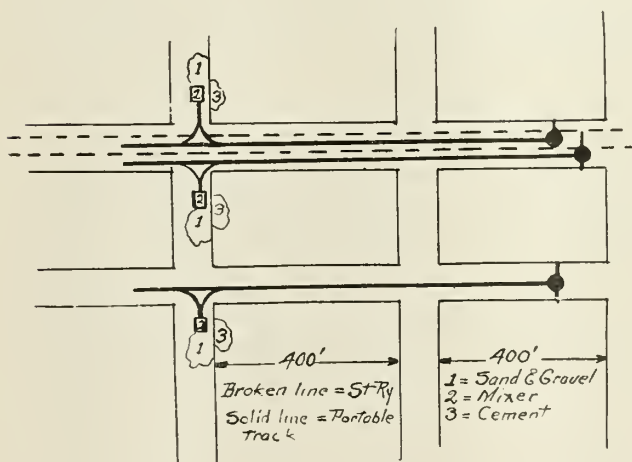
Layout of Equipment Used in Laying Concrete Street Bases

The illustration shows the plan of an installation used in laying the concrete street bases in Portland, Oregon.

This installation embodied several novel features, and resulted in a great saving in both time and money over the ordinary methods of handling concrete in this kind of work.

The raw material was piled on a cross street back of the mixer, and a drag bucket was used to haul the sand, gravel and cement to the mixer.

On the streets where there were no railway tracks, Koppel portable track was laid down the center of the street, a Y switch leading to the mixer, as shown in the drawing. A turntable was placed at the end of the track, and from the turntable, short sections of portable track were laid



at right angles to the length of the street, and reached to the curb line.

The mixer unloaded directly into Koppel steel dump cars, and the cars were then run down the track to the right or left, and the concrete deposited, just where it was needed, requiring very little shoveling. In this way, a section of the street base was laid clear across the street, after which the turntable and cross tracks were moved 6' or 7' back toward the mixer, by merely removing a section of the portable track.

On the streets where there were double railway tracks, two different methods were employed in carrying on the work. In both of these methods,

the mixer, materials, and Y switch were placed as in the method just described.

On some of the streets the portable track was laid the length of the street between the two railway tracks. This method allowed the concrete to be dumped to either side of the portable track, thus filling in the space between the railway tracks. At the end of the portable track, a turntable was placed, from which a section of portable track ran to one curb. This left one of the railway tracks clear, while on the other, when a car came along, the cross section of portable track was very easily lifted up, and replaced after the car had passed. The turntable and portable track were blocked up just enough to permit the cross track to be laid on top of the street railway rails, so no elevated tracks were required. After the one side of the street, and the section between the railway tracks, were completed, the portable track was moved to the other side of the street and that part of the street completed. Another method employed on streets with double railway tracks, was to lay the portable track on one side of the street, and fill in that side of the street and one of the railway tracks. The portable track was then moved to the other side of the street, and that side and the other railway track filled in. This left a space between the two railway tracks to be filled in which was done by using the turntable and a cross section of portable track which was on either side of the street.

In all three methods employed, the concrete was dumped away from the portable track and as a section of the base was laid, a short section of the portable track was removed and the turntable and cross section of track moved back toward the mixer.

The great advantage of all three methods was that the concrete was placed just where it was needed, and handling the concrete reduced to a minimum.

Leonard C. Wason, president of the Aberthaw Construction Co., states that in his opinion five per cent taken out of the proper cost of a concrete building decreases its value one-half.

The particular reason why concrete men owe a debt of gratitude to the bricklayers is stated by Morton C. Tuttle, secretary of the Aberthaw Construction Co., Boston, in a recent paper. He says: "The cost of cement and the labor cost of building reinforced concrete are two items unique in our day, in that they have decreased in the last few years. The labor cost has gone down in the face of higher wages, because of greater skill in planning and executing work. If this cost continues to drop, and the price of lumber and the cost of brick work continue their present rise the two constructions will eventually exchange positions. The concrete industry has to thank the brick layers and their decreasing output per man at higher wages for much of its advance."

Proof of the Value of Concrete Pipe for Public Sewers*

BY GUSTAVE KAUFMAN, C. E.†

The matter brought out in this paper is based upon the experience gained from the use of concrete sewer pipe in Brooklyn, N. Y. As is generally known, about 400 miles of such pipe, below 24" in diameter, have been laid and are in use there. It can be truly said that this pipe has given eminent satisfaction to the authorities and has been maintained at a lower cost, per mile, than vitrified clay pipe of the highest grade.

Before starting upon the real subject of this paper a description of this pipe, and the method of its manufacture, is here given.

Pipe are made in 6", 9", 12", 15", 18" and 24" equivalent capacity. The 6" and 9" are plain round pipe. They are all 3' long, with hub joint, with the exception of the 6" which is 2'3" long. The 12" pipe is round, with flat base, and the 15", 18" and 24" pipe are egg-shaped, with flat base. The thicknesses of the walls are as follows:

6".....	3/4"
9".....	7/8"
12".....	1 1/16"
15".....	1 3/8"
18".....	1 5/8"
24".....	2"

The collars are as follows:

6" collars.....	1 5/16" in depth with joint of	3/8"
9" collars.....	1 5/16" in depth with joint of	7/8"
12" collars.....	1 3/8" in depth with joint of	3/16"
15" collars.....	1 5/8" in depth with joint of	3/8"
18" collars.....	1 5/8" in depth with joint of	3/16"
24" collars.....	1 3/4" in depth with joint of	3/4"

These concrete pipe up to 1890 were made by hand, when pipe made by machine were introduced by the Wilson & Baille Manufacturing Co. With the hand-made pipe, it was always difficult thoroughly to mix the ingredients of the concrete unless the workmen were closely watched, and this frequently resulted in a pipe far from homogeneous or of equal density throughout. In the manufacture of the machine-made pipe the cement, sand and trap rock are measured and thoroughly mixed in the machine mixer, evenly fed to the molds, and rammed by machinery with iron rammers regulated to produce continuous and uniform blows of any impact desired. The resulting concrete is a product perfectly homogeneous and of equal and great density throughout.

The machine used for manufacturing the pipe consists of a mechanical tamper and a revolving table upon which the molds are placed. The tampers have a vertical reciprocating motion and at the same time move outward and inward rapidly so as to conform to the line of the travel of the mold, which owing to its oval form, presents, at each revolution, varying diameters to the successive tamping bars. There are eight tampers, made of the best tool steel, running two hundred tamps a minute each. Only one rammer is down at a time. The head, which consists of the actu-

ating machinery for the tampers, is counter-balanced upwards as the mold is being filled with concrete. The head is raised by the density of the concrete and in this way an even and regular product is obtained which is impossible to achieve by hand. The force of the blow of each rammer is estimated at eight hundred pounds. The area of the arm of the rammer is about one inch square.

PROPORTIONS

The proportions, which have been used in later years, are one and one-half parts of the best grade of Portland cement, one part of sand and three parts of trap rock screenings, containing twenty per cent of stone dust. The percentage of water used to the whole bulk varies from ten per cent to fifteen per cent, according to the condition of the ballast. The mix, when dumped on the floor is apparently dry, but will ball in the hand with some pressure. An extra mix is used in forming the collar for the reason that as the rammers do not exert a direct blow on the material in the offset, compression of the material must be depended upon.

The mixed concrete is delivered to the machines in barrows and is fed into the hoppers by two men, one on either side. As soon as the mold is full, and the core automatically lifted clear, the mold is taken up by a pipe truck and wheeled into the stripping rooms where it is allowed to stand usually thirty minutes, when it is stripped. After the pipe have set over night a spray of water is turned on and the pipe kept damp for six days when they are removed from under cover and placed in the yard. The pipe in thirty days, are set sufficiently to be handled in the work.

Spurs for house connections are connected on the pipe. A hole is cut at the proper point on the side of the pipe and a mold is placed in the interior. Cement mortar is then spread over the mold and the connection piece is bedded in place and a heavy band of mortar is wiped around the joint on the outside. After the mortar is removed the inside joint is finished with a trowel. This method has been found to be entirely satisfactory.

The main advantages of concrete pipe, over vitrified clay pipe, are:

First—They can be constructed so as to give them an oval or egg-shape.

Second—They can be made with practically no variation in size.

Third—They can be constructed with a flat, broad and level base.

Fourth—The joints can be made so that the pipe are self-centering and so that the joints will fit so closely that a continuous smooth bore can be obtained.

Fifth—They can be made in many localities where the cost of vitrified pipe is prohibitive.

Oval or egg-shaped pipe are very desirable where the flow of sewerage is variable and where the gradient is very slight. The small invert will per-

*Presented at the eighth annual convention of the National Association of Cement Users, Kansas City, Mo.

†Chief engineer, The Wilson & Baillie Manufacturing Co., Brooklyn, N. Y.

mit the flow of small quantities of sewerage with minimum friction on account of the wetted perimeter being less than in the circular pipe.

Pipe of such shape are thoroughly self-securing whenever there is an increase in the flow of the sewerage and besides will effect a decided saving in flushing water. Pipe of this shape cannot be made of vitrified clay, due to the warping in burning.

In the Transactions of the American Society of Civil Engineers, June, 1911, George T. Hammond, Brooklyn, N. Y., while discussing the paper on *Monterrey Water Works and Sewerage*, strongly advocated the use of egg-shaped pipe, even as small as 8" in diameter. In the Monterrey system, 8" vitrified pipe was used, but its capacity was much greater than necessary at present. Mr. Hammond says:

The writer's experience with concrete pipe, derived mainly from a long service in sewer design and construction in Brooklyn, N. Y., leads him to believe that at Monterrey the whole sewer system might, with advantage, have been built with concrete pipe, using an egg-shaped pipe with an area slightly larger than an 8" circle designed for a discharge equal to an 8" pipe for all the smaller sewers. The invert of such an egg-shaped pipe would fulfill the present requirements in carrying a very small flow with good flotation depth, better than would a 6" circular pipe, and the reserved capacity of the 8" pipe would be secured without interfering with good present service. Egg-shaped pipes, similar to those used in Brooklyn, the writer believes would have given far better satisfaction throughout the Monterrey sewerage system than circular fire-clay pipe, and would have cost no more, but probably less. The egg-shaped pipe referred to is made with a flat base and a self-centering joint, thus insuring perfect alignment, and a smoother interior surface than can be obtained with fire-clay pipe.

Concrete pipe, in curing, retain accurately the shape given to them by the molds. Vitrified clay pipe, especially in sizes from 15" and up, are considerably warped, due to the burning.

In Brooklyn and in many parts of Europe concrete sewer pipe are molded with a flat, a level base. Such a base permits the pipe to rest on a flat foundation, either earth or plank, and thus permits better back filling. Improper back filling is the cause of much breakage in circular pipe, not supplied with a flat base.

The joints of concrete pipe should be so designed that the hub and socket will accurately center themselves. This can be done in concrete pipe by making the socket with slightly flaring ends, thus causing the hub, when driven home, to come to its proper position. The vitrified pipe, on account of the warping in burning, must have wide sockets. Such wide sockets are the cause of the off-setting at each joint wherever they are laid. These jogs, or off-sets, collect solid matter in a sewer, and, of course, retard the flow very much. When small openings are used, such as can be made with concrete pipe, this difficulty is entirely eliminated and a close and smooth joint is the result. In many places no cement at all is required in the joint as the silt in the sewage quickly fills up the small opening.

In many sections of the country vitrified pipe can only be shipped at great expense, and, wherever, under such conditions, concrete material can be ob-

tained, it is far cheaper to make sewer pipe of concrete. In many places in Europe, where there are no clay deposits, concrete sewer pipe has been used for years without any question whatever as to its suitability for sewer purposes.

DURABILITY

In 1877, when Julius W. Adams, past-president of the American Society of Civil Engineers, was chief engineer of the City of Brooklyn, there was a proposal made that the use of earthenware pipe should be resumed. This proposal was adversely reported upon by Mr. Adams. The following are some quotations from his report:

Last winter there were careful inspections made of our pipe sewers. In one subdivision the grades of streets are over two and one-half feet to the one hundred, and a special examination was made of the pipe in this sub-division. There is no sign of disintegration or wearing away of the cement pipe. These pipe have been laid over five years. There has been considerable written about the "acids" acting injuriously upon cement pipe, but these acids in sewerage matter are greatly diluted, and I am convinced by the experience in this city that they will seldom destroy a good cement pipe. We have known no case in this city, where the street sewer has been disintegrated or eaten away by sewer acids or gases. On March 25, 1873, this department took up a cement pipe that had been laid in Fleet street in the year 1851, and the pipe was found in every particular, as good as when laid. The fact remains, however, that the renewals of sewer pipe in Brooklyn, on account of breakage or collapse, have been relatively less in the case of concrete than in that of earthenware pipe.

Since the above was written, many more miles of concrete have been laid, and, as stated earlier in this paper, over 400 miles of concrete pipe are in use in Brooklyn. The experience of Mr. Adams has been confirmed since that time. The cost of maintaining concrete sewer pipe has been proven to be less than that of vitrified pipe. This includes renewals, due to breakage, action of acids and so on. It might be of interest to note, that a few years ago, at the time of the construction of the subway in Fulton street, Brooklyn, more of the Fleet street sewer pipe, referred to by Mr. Adams, was taken up and it was found that it would be still good for a long time. The sewer was then about fifty years old. A few lengths of this pipe are in our possession. It is manufactured of Rosendale cement, Cow Bay sand and gravel.

Much has been written about the effect of acids upon concrete pipe sewers. The main argument against the use of concrete pipe is that it cannot withstand the effect of sewerage, nor resist the action of acids. In Brooklyn but two cases have been called to our attention where there has been a failure of concrete pipe, due to concentrated acids being admitted in the sewers. Inasmuch as such sewers have been in existence for so many years, the percentage destroyed is entirely negligible. The author desires, at this point, to make the statement, as an engineer, that if it is desirable to install a sewer which is to take concentrated acid discharges from manufacturing concerns, he would not advocate the use of concrete pipe, but would suggest, for such conditions vitrified pipe of the best quality, with joints of some asphaltic or acid re-

sisting material and that manholes be built of some other material than brick, laid in cement, because strong acids effect not only cement, but brick. It seems to be folly to dwell upon such a contingency. No manufacturer is going to be so extravagant as to permit highly concentrated acids to be wasted. They are too valuable.

Mr. Adams in his report of 1877, says:

There has been considerable written about the acids acting injuriously upon cement pipe, but these acids in sewerage matter are greatly diluted, and I am convinced by the experience in this city that they will seldom destroy a good cement pipe. We have known of no case in this city where the street sewer has been disintegrated or eaten away by sewer acids, or gases.

A. J. Provost, in *Municipal Journal and Engineer*, Vol. 20, page 388, says:

The argument advanced against concrete sewers is still confined to possible disintegration by acids. The fact remains, however, that the renewals of sewer pipe in Brooklyn on account of breakage or collapse have been relatively less in the case of concrete than in that of earthenware pipe.

Rudolph Hering, consulting engineer, in a report dated Feb. 15, 1908, to Honorable Bird S. Coler, president of the Borough of Brooklyn, says:

Portland cement used for the manufacture of concrete pipes is attacked by certain strong acids, such as sulphuric acid, which converts the carbonate into sulphate of lime, otherwise call gypsum, which is comparatively soft and easily eroded. Therefore, cement pipe cannot be used where strong acids are known to enter the sewers.

Vitrified pipe will stand the effect of most acids. When the joints are made of cement these will, of course, be acted upon by acids as readily as the cement pipes.

It should be added that the acid question should be viewed in a reasonable light. When the dilution of sewage is sufficient the discharge of a small amount of even strong acid will not cause objectionable effects, as evidenced by European cities where the use of concrete sewers is almost exclusive in some cities, as Paris and Vienna. In England concrete sewers are also very common. Strong acids attack not only cement, but brick. Yet brick are extensively used both in America and in Europe for building large sewers, where naturally any acid would be very dilute.

The greasy substance which is usually found to coat the perimeter of a sewer under the water-line tends to protect the cement from the action of acids to some extent.

It should be added that just as it is objectionable to discharge exhaust steam into sewers and the waste from gas works, which many cities prohibit so it should be prohibited to discharge strong acid wastes into the same.

The joint committee on Concrete and Reinforced Concrete of the American Society of Civil Engineers, American Society for Testing Materials, American Railroad Engineering and Maintenance of Way Association, and the Association of American Portland Cement Manufacturers, in its report presented at the annual meeting of the American Society of Civil Engineers, Jan. 20, 1909, says:

Concrete of first class quality, thoroughly hardened is affected appreciably only by strong acids which seriously injure other materials. A substance like manure, because of the acid in its composition, is injurious to green concrete, but after the concrete has thoroughly hardened, it satisfactorily resists such action.

The author has positive knowledge that over 400 miles of such pipe laid in a period of over 50 years are giving eminent satisfaction in Brooklyn and in his opinion all arguments against its suitability for sewers are answered by that fact.

Making and Driving Reinforced Concrete Piles Within Six Days*

BY ROBERT A. CUMMINGS.†

It is well established that concrete piles are a satisfactory substitute for wooden piles in increasing the stability of foundations, whether they are of the "cast-and-driven" type or the "cast-in-place" type.

The "cast-and-driven" type are made of reinforced concrete, molded to the desired shape and cured before being driven.

The "cast-in-place" type are made by forming a hole in the ground and filling it with concrete.

The history of the "cast-and-driven" type is intimately connected with the development of reinforced concrete and in the same manner has been embarrassed by patent litigation. In March, 1907, a final decision was reached in the British High Courts of Justice that the fundamental idea of the reinforced concrete pile was covered by Brannon's patent of 1871, and that subsequent improvements must be limited to the details of reinforcement.

At the Chicago convention of this Association in 1909, the writer described certain tests and methods of reinforcing for increasing the unit value of concrete in compression. It is the application of one of these methods and other practical improvements that form the subject of this paper.

It is nearly ten years since the writer began the design and manufacture of concrete piles. During this period, by a process of elimination, an efficient method of reinforcing has been developed, which is correct in design and economical in cost.

METHOD OF REINFORCEMENT.

All piles of the cast-and-driven type must be reinforced with longitudinal rods, because the pile is hoisted and handled by a line from the pile-driver which is fastened at or near the butt. Consequently, the pile has to sustain its own dead weight by being raised, as well as shocks and impact against obstacles, before reaching its position in the leads of the pile-driving machine. With the point on the ground and the other end being elevated, the pile must act and be designed as a beam supporting its own dead weight and shocks. The limiting proportions of depth or thickness of pile to the unsupported beam length produces heavy tension and compressive stresses, with considerable deflection.

It has been observed that when handling a pile of this type, it rarely fails in compression in the concrete, but cracks are usually discovered on the tension side. These cracks can be accounted for by the slipping of the usual longitudinal rods used in the concrete while the pile is being hoisted. While such cracks are not sufficiently serious to condemn the pile, they may affect the permanency of the reinforcement.

In order to overcome this defect all longitudinal rods should be anchored at the ends, those at the butt opposite each other being bent over into a loop and

*Presented at the eighth annual convention National Association of Cement Users, Kansas City, Mo.

†Consulting engineer, Pittsburg, Pa., M. Am. Soc. C. E.

welded together, while those at the point are all brought together and electrically welded into one piece. Twisted and deformed rods are advantageous for longitudinal reinforcing, as the allowable bond stress is higher than for plain rods.

The uniform circumferential spacing of longitudinal rods is very important, because any side of the pile may be subjected to tensional stresses, and whichever side is in tension there must be sufficient steel in position to take the strain. The circumferential spacing of the longitudinal rods can be secured by means of a special spacing device placed at intervals of about 5' throughout the length of the pile.

The hooping of concrete adds greatly to its ability to resist axial loads. Therefore, longitudinal reinforcing should have a helical wrapping of wire throughout the length of the pile, the pitch of which must not exceed 3". This wire wrapping will assist in taking care of diagonal stresses resulting from handling the piles.

Practical experience indicates that the butt end of the pile which receives the impact of the hammer should be especially reinforced. This has been done by means of a special reinforcement consisting of a unit cage of flat bands, held 2" on centers by a spacing bar for a distance of 2'. In the plane of each band a flat wire spiral is fastened to the cage. The embedment of this unit cage in the butt of the pile forms a resilient cushion to receive the impact of the hammer. In no case, in the driving of thousands of piles with this cushion, has the butt itself been broken.

METHODS OF DRIVING

Piles of the "cast-and-driven" type are handled and driven by means of an ordinary pile-driver. The ability to vary the fall of the drop-hammer is of great utility in overcoming the variable resistances to be met with in the driving. It has been found advisable to increase the weight of the ordinary drop-hammer in ratio of weight of hammer to weight of pile of from 2 or 3 to 1, so that the weight of the drop-hammer for driving the concrete piles will vary from 7,000 to 12,000 pounds.

Steam hammers are not as efficient or desirable for driving concrete piles as are drop-hammers. This was shown last fall on a contract when a test was made between a No. 2 Vulcan steam-hammer and a heavy drop-hammer, under the same conditions, using the same kind and size of concrete pile. The heavy drop-hammer did not break the pile, whereas the steam-hammer broke several below the cushion. Further, the steam-hammer did not drive as many piles in a given time as did the drop-hammer.

The following explanation is offered as it applies also to the driving of the heavy steel casings or cores used in making the cast-in-place type of pile. The limited fall (3') and light ram (3,000 pounds) of the steam hammer, while delivering twice as many blows per minute as the drop-hammer, loses a large part of its energy in overcoming the propor-

tionately heavier weight of the pile, steel casing or core.

The following analytical treatment by Barton H. Coffey, M. E., New York city, confirms and justifies the practice of the writer in using hammers as heavy as 12,000 pounds for driving concrete piles, and it may be asserted with some feeling of confidence, that if penetration is to be the gauge for measuring the supporting power of a pile, the ratio of the weight of the hammer to the weight of the pile or core that is driven, must be taken into consideration.

The advantage of using a heavy hammer is evident from the following analysis:

$$\text{Let } M \text{ equal Mass of hammer} = \frac{W}{g}$$

Let W equal Wt. of hammer.

Let X equal Wt. or mass of pile in per cent of hammer.

Let V equal Velocity of hammer on striking pile.

Let VI equal Common velocity of hammer and pile.

Momentum of hammer = MV (on striking pile).

Momentum of hammer and pile at common velocity = $M(I+X)VI$.

These are equal provided no external force acts, which we will assume for the present is the case.

Then $MV = M(I+X)VI$. Therefore $VI = \frac{V}{1+X}$

$$\frac{V}{1+X} \text{ — — — (1)}$$

The energy in hammer on striking pile is

$$\frac{1}{2} MV^2 \text{ — — — (11)}$$

The energy in both hammer and pile at common velocity is

$$\frac{1}{2} M(I+X)VI^2, \text{ which upon substituting (1)}$$

$$\text{becomes } \frac{1}{2} M \frac{V^2}{1+X} \text{ — — — (111)}$$

The difference between (11) and (111) represents the *loss of kinetic* energy in the system at point of common velocity or greatest compression. In other words, the percentage of the original energy of hammer that has gone into compressing pile and hammer, distorting or crushing them, and into heat, broadly-internal work—done upon each other by the striking bodies. Obviously, the smaller this percentage of internal work, the less liability there is of crushing or distorting the pile. To resume:

$$(11) - (111) = \frac{1}{2} MV^2 - \frac{1}{2} M \frac{V^2}{1+X} = \frac{1}{2} MV^2$$

$$\left(1 - \frac{1}{1+X}\right) IV$$

Equals the internal work. The following table gives

the internal work for various values of X in per cent of the total kinetic energy of the hammer:

X	Internal Work.
0.25	20%
0.50	33%
0.75	43%
1.00	50%
1.50	60%
2.00	67%
3.00	75%

If the hammer weighs four tons and the pile one ton there will be 20% internal work at maximum compression, whereas if the pile weighs eight tons the internal work will be 67%.

There is an external force acting against the pile, i. e., the frictional and displacement resistances of the earth.

Two extreme cases may be assumed limiting all others.

1st—There is no external force. There the internal work will be simply that necessary to overcome the inertia of the pile and put it in motion. In this case the table is rigorously accurate.

2nd—The external force is great enough to prevent any movement of the pile. In this case the entire kinetic energy of the hammer goes into the internal work, and the relative weights of hammer and pile are immaterial.

All intermediate cases where movement occurs are a combination of 1 and 2, where obviously it is advantageous to employ a heavy hammer.

MANUFACTURE.

The procedure in constructing "cast-and-driven" piles commences with the preparation of the molding bed. This, of course, will vary with the site, but it is desirable to select a flat and convenient location near the place of driving. It is very important that the bed shall be stable, so that settlement due to the weight of the piles is avoided. Where the ground is soft and yielding, pine stakes 2"x4"x3', pointed at the ends, are driven to a solid bearing. These stakes are located at intervals of about 4' in each direction and the tops cut to a uniform level. Then 4"x4" pine sills are toe-nailed to the tops of the stakes in longitudinal rows about 4' on centers. Upon these sills a 2" solid wooden floor is placed, which forms the molding bed. It is desirable that this bed shall be uniformly level to receive the forms for the piles.

The forms are made of two pieces of 2"x8" dressed pine battened together and placed on edge to form the sides of the pile. The bevels or angles for tapered or octagonal piles are made by placing loose pieces of bevelled wooden strips at each corner of the form. The steel reinforcement is delivered on the work in factory-made units, so that it can be placed in the forms at once. When a reinforcing unit is suspended and centered in position, the concrete of a wet consistency is deposited and carefully puddled. As soon as the concrete of the pile has solidified, the forms are stripped and used for making other piles. The number of forms re-

quired will vary with the quantity of piles to be made and the prospective salvage in the lumber.

The curing of concrete in the normal manner delays the driving of the piles for a period of not less than three weeks, although a greater length of time is desirable, especially in cold and damp weather. Therefore, unless a stock of cured piles is always on hand, it frequently occurs that this type of pile cannot be used at all, and resort is had to the use of the "cast-in-place" type. This practice is open to question on account of the inability of plain concrete to resist even moderate tension. In fact, it is almost axiomatic that all concrete piles must be reinforced. Every concrete pile is subjected to strains that induce very serious tensile stresses in the pile. Such stresses may result from superimposed loads or a lateral strain from the soil.

Further, the making and storing of concrete piles for use at any time necessitates a large financial investment.

In order to avoid the above-mentioned objections, the writer has adopted the method of steam curing of "cast-and-driven" piles. This enables such piles to be made and driven within 3 or 4 days and places the speed of driving on the same basis as that of the "cast-in-place" type.

The means used for steam curing will vary with circumstances, location of the work, speed required for delivery of the piles, the number needed, etc. In the last winter the writer has used concrete piles made and driven within 10 days, and, as a result of this experience, confidently recommends that such piles can be made, cured and driven immediately.

On the work with which the writer was connected, the piles were allowed to set in a normal manner for 5 or 6 days, and were then gently hoisted from the molding bed by a derrick, using an equalizing spreader and bridle, the chains of the bridle being fastened so that the pile was balanced. They were then placed in stacks of 25 or 30 and separated from one another by wooden blocks, particular attention being given to securing a solid bearing for each pile.

A light wooden shed, practically steam tight, was built entirely around the stack of piles. The steam was conducted direct from a boiler through a 1" pipe to three branch openings inside the shed. The steam pipe valve was opened and the piles were exposed to live steam for 2 or 3 days, when they were found to be ready for driving. On being first exposed to steam, the moisture condensed on the surface of the piles and remained until absorbed by the concrete when the temperature of the steam was reached. This steam treatment should be distinguished from heat applied indirectly or baking, in accelerating the set and hardening the concrete. The writer sees no reason why boiling water should not be used for the same purpose if the conditions are favorable for adopting this method.

Precautions should be exercised in making sure that the concrete has solidified and that it has received its initial set, before exposure to steam treatment.

The prospective field that is opened up by the steam treatment for the rapid curing of concrete seems to the writer to solve the difficulty incidental to the present methods of procedure in the construction of all classes of concrete structures.

The attention of the members of the Association is directed to the publication of the tests of the Structural Materials Laboratory of the United States Geological Survey, wherein it is conclusively shown "that a compressive strength considerably (in some cases over 100 per cent) in excess of that obtained normally after ageing for six months, may be obtained in two days by using steam pressure for curing mortar."

Practicing engineers will have little difficulty in modifying the writer's methods and using improved schemes for quick curing of the piles with steam; and in this connection it may be of interest to state that the writer has already underway the construction of steel molds and appliances for the steam treatment of concrete piles.

Light Concrete Construction

It is possible to design a concrete building so light that it will cost no more than one of mill construction, in the opinion of Morton C. Tuttle of the Aberthaw Construction Co. He said in a recent paper that such a building, however, is a very poor one to buy, and that if one is not willing to pay an advance over the price of mill construction it would be advisable to give up considering the material. He spoke of concrete floors and referred to the new print works of the Pacific Mills, South Lawrence, Mass., where wet processes and fire processes are put under seventeen acres of concrete floors, while the dry light manufacturing is cared for with ordinary mill construction. "For bleachery and dye houses and steaming processes," he says, "timber has caused endless trouble, and today the concrete floor has replaced wood. Where the life of wood is only five years or so the extra first cost of concrete is overcome by the depreciation item. Concrete construction is popular to some extent for textile establishments, but the light floor loads required in mills furnish the chief reason why more of them have not been built of this material. Somewhere at above 200 pounds live floor load the concrete meets the price of timber for floor construction. Below this figure a great saving is made possible by using wooden floor construction. For storage buildings, where heavy loads are to be carried, concrete has been particularly successful.

George S. Bartlett, Milwaukee, Wis., has joined the forces of the Universal Portland Cement Co. Mr. Bartlett has been identified with the manufacture and sale of Portland cement for a great many years and has a very wide acquaintance among cement men the country over.

Good Roads Movement Progressing All Over Country

The publicity department of the American Road Congress announces that President Taft has given his consent to serve as honorary president of the Congress which is to be held in September or October—exact time and place not having been decided upon. The Congress will be a combination of the conventions of the American Association for Highway Improvement, the American Automobile Association, the National Association of Road Material and Machinery Manufacturers, and affiliated organizations.

The President has agreed to act as honorary president because the congress is designed to crystallize the road movement in the United States. All the associations which are to participate in the Congress have previously been holding individual conventions. All have been working whole-heartedly, but in different ways, for the improvement of the roads of the United States. The Congress will bring all factions together. It will line up the farmers with the automobilists; the state road authorities with the federal authorities; the manufacturers with the engineers; the scientists with the laymen.

The United States Office of Public Roads has arranged to present a complete exhibit of all its electric models, showing road machinery at work, and models showing the various types of road. There will be stereopticon views and lectures by experts. President Taft, as honorary president of the congress, will make an address. The other speakers will include some of the leading government officials, diplomats, engineers, and railroad and automobile men. The convention will last a week and there will be a program for the entertainment of the distinguished guests.

The great economic principle at the basis of the educational work of the American Road Congress is that money invested in the public roads makes annual returns almost as great as the money originally expended. The officials of the Congress have prepared figures showing that the improvement of the main highways of the country, constituting about 20 per cent of all public roads, would result in an annual saving of at least \$250,000,000 in the cost of hauling alone. It is estimated that the amount saved annually in hauling alone would be sufficient to improve 50,000 miles of road at an average cost of \$5,000 per mile. In five years this would improve 250,000 miles of road, which would be sufficient to bring the total mileage of improved highways up to the required 20 per cent. The increase in land values is another important factor that will be dwelt upon at the Congress.

Attention is called in a recent bulletin of the Universal Portland Cement Co. to the false economy of building roads on a long time bond issue without proper preparations for maintenance. "Fair treatment of the next generation demands that the roads

shall at least give service without excessive maintenance cost until the loan is redeemed. This should be the key-note of the good roads movement. There is no question that the need for highway improvement is great; there is no question that it is true economy to build expensive road systems, and yet without serious thought upon the problem of maintenance the most carefully constructed road may prove a financial failure. This is in no sense a criticism of those counties and states where they are now finding macadam to have failed because conditions in the last few years have been entirely changed. Automobile traffic has upset the standards of construction and what was economical, sound engineering five years ago, has under the changed conditions become a wasteful and uneconomical method of construction. Therefore, we must today cope with difficulties hitherto unknown, rather than condemn the practices of a few years ago as showing lack of engineering skill and foresight on the part of those whose best endeavors went into road construction, wholly in accordance with the best known practice of those days."

That such states as Missouri, Kansas, Illinois and Nebraska are more stirred up over the nation-wide movement for the betterment of public roads than they are over the presidential political situation was the assertion of Charles P. Light, Field Secretary for the American Association for Highway Improvement, after returning from the most extensive trip ever made in the interest of the road movement. Mr. Light visited large and small cities in the west, aiding in the work of organizing associations to be affiliated with the American Association for Highway Improvement. He insists that the West is far more excited about outdistancing the East in the matter of improved public roads than it is about the personalities of the candidates for the presidency.

"The people in the West realize that prosperity must be increased and they believe that the way to increase it is not artificially by legislation, but fundamentally by improving the roads of the country and thus enabling the farmer to ship his products at all seasons of the year, reducing the cost of hauling, and eventually bringing the cost of living down to normal," said Mr. Light.

"In Kansas city I attended the sessions of the County Road Engineers of Missouri, the Cement Exposition in Convention Hall, and the meetings of the National Association of Cement Users. In nearly every city and rural community visited by me, I found that the road movement had preceded me. In Jackson County, Missouri, for instance, there is a splendid organization, including the county court officials and the county road officials. Judge Hugh C. Gilbert, of the county court, who is taking such an interest in the movement in his own county, is a prominent member of our Association. When I say that nearly 700,000 gallons of oil were used last season on the macadam roads of Jackson county, it

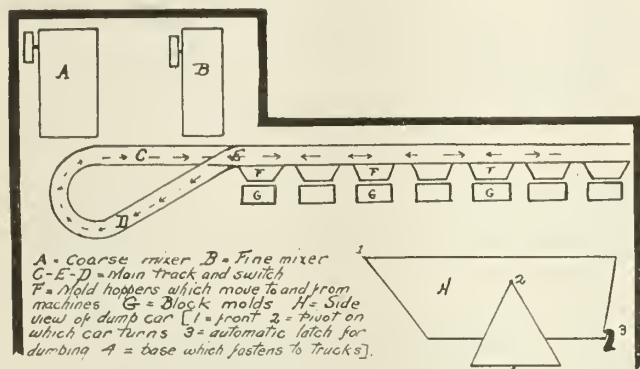
can be realized what a hold the movement has taken on that county. The one thing that we are urging in the west now is skilled supervision of the highways and the elimination of politics. If the west will employ none but skilled engineers and eliminate politics from the supervision of the roads, a bigger return will be obtained from the millions that are being invested."

The trip of the "Good Roads Special" through Texas, Oklahoma, Arkansas, Louisiana, Missouri and Alabama, was arranged as a result of the co-operation of the United States Office of Public Roads and the American Association for Highway Improvement, with B. F. Yoakum, chairman of the 'Frisco Lines, who is also a member of the Executive Committee of the American Association. The full government exhibit, showing the effects of good roads and bad roads with stereopticon views; electric models showing how roads are made, and stone crushers at work, is on board the train. H. S. Fairbank, assistant field secretary of the American Association, is delivering lectures from the train, and at every stop is lending his aid in the formation of road improvement associations for the local communities. In his report to Secretary Pennybacker, he says that twenty such associations have been formed already and that all have become affiliated with the American Association for Highway Improvement. The "Good Roads Special" is one of the best equipped ever sent on tour and its visits are meeting with enthusiastic approval from each section where a stop is made.

Picking out individual states, each in turn, and covering them from end to end with local associations dedicated to the movement for the improvement of the public highways, is the method that is being pursued by the American Association for Highway Improvement in its campaign to coordinate and crystallize the road movement in the United States. Fred S. Smith, the special representative of the American Association for Highway Improvement, has just reported to J. E. Pennybacker, Jr., executive secretary of the association, that Florida has been covered from end to end with local road improvement associations. In the twelve weeks in which Mr. Smith worked in Florida, he covered 3,200 miles in an automobile, traversing 24 counties and 37 towns. The representative of the American Association for Highway Improvement addressed sixty meetings in the various counties, in some of which bonds have since been issued for the purpose of investing in improved public highways, which Mr. Smith assured them was the best investment on earth. The American Association is now preparing for similar campaigns in Illinois, Ohio, Indiana, and West Virginia. Meanwhile, Field Secretary Light is doing similar work in the Western states.

Easy Means of Conveying Concrete From Mixers

The sketch shown illustrates part of the concrete products plant of William E. Thompson, Northville, Mich. The idea is simply to provide a track and special type of dump car to convey both the coarse mixture and the facing mixture used in block manu-



facture from the mixers to the machines or molds in the least time and with the least labor. The idea of the dump car is given in the drawing at H. This sketch merely shows a box, the end marked 1 to be tipped forward on the pivot 2, when released by a latch at 3, this latch being fastened to the truck on which the device shown is mounted. This hopper is loaded with mortar or concrete at the mixers A and B and moves along the straight piece of track, dumping into the hoppers in front of the block molds. The car is then run back taking the switch at E and going around the loop, while another car which has been filled at the mixers has been shoved out on the track. This switch is always open and it does not have to be turned with the passing of each car. Mr. Thompson says that one man operates the system conveying the concrete from the mixers to the molds. He says that the special hopper and track obviate the employment of two men where one man is now enough, and four wheelbarrows where two cars are sufficient.

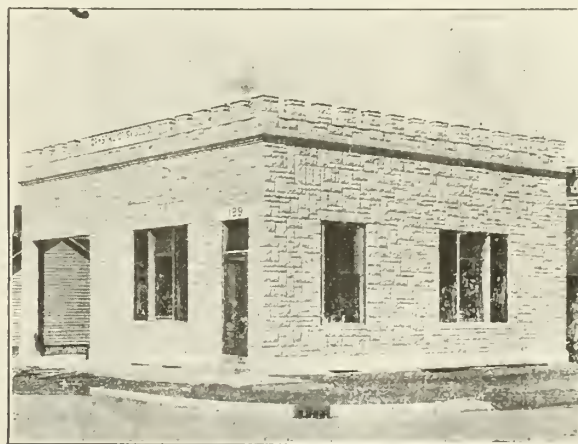
Progress of the Engineer*

The engineer by reason of training and on account of his work is usually of a retiring disposition. His training usually has not been such as to make him a good speaker, and his work is such that he will not hastily express opinions. As soon as one problem is solved he is busy on another, and then as some one else will do the talking, he does not get the credit for the work which he has done. In spite of this trait, which is a good one to some extent, the importance of his work and the method of careful and systematic study of various problems, are not only being more widely recognized than formerly, but it is also recognized that his training

fits him for positions of greater responsibility and broader scope. And so it has been said many times recently that the engineer is beginning to come into his own. Engineering is now classed among the learned professions, and with this elevation of the profession come greater responsibilities and greater necessity for maintaining its conduct on a higher level professionally and ethically.

This is an era of great industrial development, and the work of inventing, developing and putting into actual operation of the scientific and industrial enterprises must fall largely upon the engineer. In the annual message of the president of the American Society of Mechanical Engineers, Colonel Meier says, "Engineering is the profession of the present, and will dominate the future."

On account of the commercialism prevalent today, it is with greater difficulty that the high standards are maintained. In this development the engineer is coming to be relied upon more, so that his position is becoming increasingly one of responsibility even as to leadership. With this increasing responsibility must come a keener realization of the professional and ethical sides, in order to insure further increase of the regard in which the profession is held.



The little office building is not done in true broken ashlar, as will be seen, the long joints being vertical and so arranged that some of them come together. Yet the effect is not at all displeasing and many will find it very attractive. The work was done by the Waterloo Plaster Co., Waterloo, Ia., with block made on a Hobbs machine. The building is for the Crystal Ice & Fuel Co. and is 32' x 37' ground plan with a height of 18' 6". The walls are 8" thick. The cost of the concrete walls above the foundation was \$655.

SURGES CONCRETE BUILDING BLOCK COMPANY,

Irvington, New Jersey, May 14th, 1912.

Concrete Publishing Company,
Detroit Mich.

Gentlemen:—We may as well be out of the concrete business as to be without your Journal, as this is our best counsel. Enclosed find \$1.00 for one year's subscription.

(Signed) A. J. SURGES.

*From a paper, *The Work, Aim and Conduct of the Engineer*, read by Chas. T. Main, mill engineer and architect, before the Boston Society of Civil Engineers.

Facts as to Concrete Sewer Pipe in Kansas City and San Diego

A great deal of interest has centered in the contest in Kansas City, Mo., between the clay and the concrete interests over the future sewer construction in that city.

CONCRETE has no desire whatever to discuss the local politics which may or may not have entered into that contest. Despite the fact that the interests opposed to concrete have been circulating literature to the effect that concrete was virtually beaten in that fight there are many who will be glad to learn the drift of the matter and the *fact* as to whether or not concrete sewer pipe is now being used in Kansas City.

Several months ago the City Council of Kansas City passed a resolution requiring the Board of Public Works to admit concrete pipe in all sewer contracts unless the city engineer, the engineer in charge of the sewer division and the city chemist should together express to the council a specific reason for not using it.

Then followed an investigation in which a committee of the council took much testimony pro and con. This committee reported rather unfavorably as to the use of concrete pipe in the sewers. In the city election which followed, the only member of that committee up for re-election was defeated by the people at the polls. The council finally decided after the committee investigation that it had no authority to dictate to the Board of Public Works as to what pipe should be used.

Since that time the Board of Public Works has let a contract for more than a mile of concrete sewer in sizes from 6" to 24" diameter.

In a letter to CONCRETE L. R. Ash, city engineer, says: "As matters stand now in Kansas City, cement concrete pipe is included in our specifications and contracts will be awarded for this material when the bids for it are lower than for the vitrified pipe."

In this connection readers will be interested in the letter which follows, reporting tests of the Kansas City pipe and in still other correspondence which follows regarding tests made in San Diego, California.

Kansas City, Mo., March 23, 1912.

Kansas City Concrete Pipe Company, City.

Gentlemen:—We herewith report the results of the tests made on samples of your Concrete Sewer Pipe:

Our laboratory number, Q-714 (Nov. 14th, 1911).

EXTERNAL CRUSHING STRENGTH. (COMPRESSION TEST)

Dimensions of Pipes:

Internal diameter	15	inches
Length of barrel	24	"
Length of bell	2	"
Total length of pipe	26	"
Thickness of pipe	1½	"

Composition of Pipes:

Iola cement	1	part by volume
Kaw River sand	3	" " "

Age of Pipes:

Number of days since made	28
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Mode of Manufacture:;

Machine made—hard rammed.

Testing Machine used:

Riehle testing machine; capacity, 400,000 pounds per sq. inch.

Mode of Application of Load:

The pipe was embedded in compact sand in a box of suitable size and eight inches in depth, containing 7 inches of

compact sand; the pipe was so placed in the sand that there was no appreciable displacement of sand at the sides; the pipe was carefully leveled, then a machined bar—one inch square cross-section, and of suitable length—was centered along the crown of the pipe, and on this was placed a steel "I" beam of suitable size and length, being placed squarely upon the square bar, and upon this "I" beam the head of the testing machine made direct contact bearing.

The load was applied slowly and evenly, the actual load being accurately registered by the delicately balanced beam of the machine, at point when first fracture occurred in the pipe under test.

The one-inch bar and the "I" beam were exactly centered longitudinally the entire length of the actual barrel of the pipe, at crown, thus giving pressure evenly upon the pipe at point of contact.

RESULTS OF EXTERNAL CRUSHING TESTS

Actual length of pipe subjected to compression....20 inches
1¾ linear feet

ACTUAL POUNDS REQUIRED TO CRUSH THE PIPE

Pipe No. 1.....	2730	pounds
Pipe No. 2.....	3290	pounds
Pipe No. 3.....	2720	pounds

Average 2913½ pounds

CRUSHING STRENGTH PER LINEAR FOOT

(Total strength divided by linear ft.)

Pipe No. 1.....	1638	pounds per linear ft.
Pipe No. 2.....	1975	" " "
Pipe No. 3.....	1632	" " "

Average.....1748½ " " " "

Required by city specifications: 1300 lbs. per linear ft.

(Specifications for Concrete Sewer Pipe for Kansas City, Missouri.)

HYDROSTATIC TESTS

(Hydraulic pressure applied internally)

Date of these tests: March 23, 1912.

Our laboratory number: R-115.

Dimensions of Pipes:

Internal diameter—No. 1, 12 inches; No. 2, 8 inches.

Thickness of pipe—No. 1, 1¾ inches; No. 2, 1¼ inches.

Age of pipe—No. 1, 33 days; No. 2, 96 days.

Mixture (composition)—1 part Iola cement to 2½ Kaw River sand.

RESULTS OF HYDROSTATIC TESTS.

Pipe No. 1 (12")	Pipe No. 2 (8")
10 pounds pressure, percolation—None—None (pressure held 5 minutes).	
20 pounds pressure, percolation—None—None (pressure held 5 minutes).	
30 pounds pressure, percolation—None—None (pressure held 5 minutes).	
40 pounds pressure, percolation—None—None (pressure held 5 minutes).	
60 pounds pressure, percolation—None—Fractured.	
75 pounds pressure, percolation—Fractured.	

Required by City Specifications—No percolation up to 10 lbs. per sq. inch pressure—and no fracture up to 33 pounds pressure per sq. inch—internal pressure.

HYDROSTATIC TESTS

Mode of Application of Hydraulic Pressure Internally to Pipes:

Machined plates made to fit top of bell and bottom of barrel of the pipe, and provided with draw bolts, four in number, so the two plates in position could be drawn tightly to the rubber gasket or washer at either end, were used to confine the water in the pipes during the tests; the top plate at bell was provided with an inlet connection for the water—also with a pressure gauge for recording the pressure—and the inlet pipe was provided with a cut-off, so that the water pressure could be held for a desired period; the pipe was filled with water then the water from the city mains was connected, and the pressure allowed to reach the desired point—and then held at these points for five minutes each, to allow time for any percolation to take place, if any, at that pressure.

Examination of the Broken Pipe After the Tests:

Both pipes broke or split longitudinally, from end to end, at the two opposite sides.

Breaking open various parts of the walls of the pipes, no percolation had taken place, and at most, in a few places,

showed wetting from the inside part of the barrel for a distance of only one-eighth of an inch.

In other words, the pipes withstood percolation up to the bursting point, and the bursting point in both cases was more than twice that as required by the specifications of the city of Kansas City, Missouri.

MECHANICAL ANALYSIS OF THE CONCRETE PIPES

	Pipe No. 1	Pipe No. 2
Cement (by volume).....	1.Part	1.Part
Sand	2.6	2.4
Required by City Specifications:		
Cement	1. Part	
Sand	2.5	

No evidence of water-proofing compounds, such as hydrated lime, aluminate soaps, paraffine, colloidal clays, asphaltic paints, etc., were found by us upon chemical examination of the concrete constituting the pipes tested.

DROP WEIGHT TESTS

IMPACT TESTS

Pipe, supported on a dry sand bed two inches deep, shall withstand without cracking the impact from two blows of a cast-iron ball weighing ten pounds, falling eighteen inches. (City Specifications for concrete Sewer Pipe).

Pipes Tested:

	No. 1	No. 2
Diameter internally.....	18"	12"
Age of pipe.....	4 months	33 days
Mixture	1 cement.....	2½ sand

RESULTS OF DROP WEIGHT TESTS

IMPACT TESTS

Pipe No. 1 (18")	Pipe No. 2 (12")
4 months old	33 days old
10 lb. weight dropped 18"....	No effect....
10 lb. weight dropped 24"....	No effect....
10 lb. weight dropped 36"....	No effect
10 lb. weight dropped 48"....	Broke

Required by City Specifications:

Shall withstand cracking from two blows from ten bound ball from impact dropping height of eighteen (18) inches.

RESUME:

Crushing strength: All the tests made far exceeded the strength per linear ft, as required by the City Specifications, and if the pipes had been the 1 to 1½ mixture—and of twice the age, would have exceeded the requirements by at least double.

Hydrostatic Pressure Test: All these tests more than double the requirements of the City Specifications, and show absolutely no percolation, and broke before percolation could take place. Pipes for these tests were made semi-wet where heretofore a dry mixture had been used, and in our opinion, all pipes should be mixed semi-wet for attaining the best results, both strength—and resistance to percolation.

Drop Weight Test: These impact tests far exceed the requirements of the City Specifications—and in one case (the older pipe) withstood almost three times the impact as required by specifications.

Selection of samples for testing: No special effort was made to select special pipes for these tests, the pipes were selected at random from the stock in warehouse, only the newer pipe—made semi-wet were used, instead of some on hand that had been made up dry mixed some time ago.

The following Engineers were present during the tests of March 23rd, 1912:

L. R. Ash, city engineer (Kansas City, Mo.)
A. R. Mandigo, asst. city engineer, (Kansas City, Mo.)
Paul McGeehan, engineer of Sewer Div. City Eng. Dept. (Kansas City, Mo.)
W. R. Henry engineer with Union Depot Bridge & Terminal Co.

Respectfully submitted,
KANSAS CITY TESTING LABORATORY.

San Diego, Cal., Feb. 23, 1912.

Mr. F. M. Lockwood, Engineer Sewer Department, San Diego, Cal.

Dear Sir:—On Saturday, February 24, at 8 o'clock p. m., the Glazed Cement Pipe Company propose to give a test of pressure on their product, known as the Glazed Cement Pipe,

as well as on the Vitrified Clay Pipe, at the San Diego Industrial Fair, in this city.

I would be pleased to have you present at this test, and also would request that you furnish for such test, six or eight sections of eight inch vitrified clay pipe of at least average strength, and also half a dozen sections of the concrete pipe, such as is now accepted by the city.

I desire the test, which will be a hydrostatic one, to be absolutely fair and on its merits, and hope that you will make such selection accordingly, and kindly make a report showing the result of such test. It is expected that the members of the Common Council will be present.

Respectfully,

[Signed]

A. E. DODSON,
Supt. Dept. Fire and Sewers.

San Diego, Cal., March 16, 1912.

Mr. A. E. Dodson, Supt. Fire and Sewers, San Diego, Cal.

Dear Sir:—Complying with your request, was present at the San Diego Industrial Fair on the night of February 24, 1912, and saw the Hydrostatic Pressure Tests made on vitrified clay and cement pipe, and beg to report as follows:

The clay pipe was bought from J. S. Schirm, they being informed that it was for purposes of making tests, and was pronounced by all who saw it, excellent pipe.

The cement pipe manufactured by the Glazed Cement Pipe Co., was taken from stock at the pipe yard by the City Inspector, Mr. F. C. Bayless, having been subjected to the fifteen pounds pressure test required by the city on accepted pipe.

There were three pieces of each kind of pipe tested, and the same guage was used on each piece, and show the following results:

No. 1—8" Vitrified Clay Pipe:

With 15 lb. pressure commenced to seep in three minutes and broke at 55 lbs. pressure.

No. 2—8" Cement Pipe:

Subjected to 15 lbs. pressure for five minutes and broke at 80 lbs. pressure with no seepage whatever.

No. 3—8" Vitrified Clay Pipe:

Small seepage in five minutes under the 15 lbs. pressure, broke at 65 lbs. pressure.

No. 4—8" Cement Pipe:

Subjected to 15 lbs. pressure for four minutes, and broke at 115 lbs. pressure with no seepage whatever at any time.

No. 5—8" Vitrified Clay Pipe:

Under 15 lbs. pressure showed seepage in one minute, and broke at 75 lbs. pressure.

No. 5—8" Cement Pipe:

Pressure was held 15 lbs. for about three minutes, than slowly ran up to 125 lbs. pressure and broke at 150 lbs. by jumping the pressure, there being no seepage at any time.

The tests were absolutely fair, and were witnessed by a large number of interested parties, many of whom made notes of results.

Respectfully submitted,

[Signed]

F. M. LOCKWOOD,
Engineer Sewer Department.

Straits Settlements.

(From Vice Consul General D. Milton Figart, Singapore.)

In the table below are shown the imports of cement into the Straits Settlements for the year 1909. No later statistics are available:

Countries.	Casks.	Value.
United Kingdom	223,856	\$539,089
Burma	10	51
Hongkong	34,223	88,508
Johore	3	10
Perak	10	28
Selangor	70	227
Austria-Hungary	17,253	40,316
Belgium	1,747	3,879
Denmark	8,000	18,034
Germany	5,196	13,425
Netherlands	1,000	2,386
Russia	3,000	5,964
French India	40	85
French Indo-China	421	854
Japan	5	11
Total	294,834	\$712,867

The exports amounted to 53,751 casks, valued at \$137,899.

INFORMATION DEPARTMENT

Inquiries regarding sand and all other materials are cheerfully answered, like all other questions, but in cases of importance it is best to invest in a laboratory analysis. Write to us for particulars, address, Laboratory Department.

Stucco Construction

Please give me some information as to the use of stucco in covering an old frame building. C., Oklahoma.

We refer you to the book, *How to Use Concrete*, price \$1.00, Book Department of CONCRETE.

* * *

Inexpensive Homes

I am interested in the construction of concrete houses for workingmen. I expect to build as many as two thousand of them. I should like information along this line. C., Brazil.

See reply to C., Illinois.

* * *

Concrete Cistern

I intend to build a rainwater cistern in my basement and I want to make sure that it will not leak so thought of making it of concrete. I should like to know how to go about it. T., Ontario.

We refer you to an instructive article in the March issue of CONCRETE.

* * *

Proportioning

Please tell me if, in making concrete for fence posts, the quantity of cement should be in excess of the voids in the aggregate; if so, what per cent of excess. T., Ohio.

The quantity of sand in a mixture of concrete should be sufficient to fill all the voids in the aggregate with an excess of five per cent, and the cement used should be sufficient to fill the voids in the sand with an excess of five per cent.

* * *

Joining New and Old Concrete

Please tell me the best way to join new concrete walls to old walls and how to make a satisfactory union between one day's work and that of the next. D., Illinois.

The most important thing is to have the surface of the old concrete thoroughly cleaned of any loose or foreign material, and to have it as rough as possible to give a good bond with the new concrete. Before the new concrete is put on, the old concrete should be well wetted and slushed over with a thin cement mortar.

* * *

Soap Waterproofing

I should like to know something about the use of soap in waterproofing concrete block. R., No address.

In response to your inquiry as to the use of soap waterproofing, we refer you to the recent report of

the Bureau of Standards, United States Government, which advises that this method cannot bring enduring results. The report says: "It is quite likely that very much more soap is dissolved and washed off the surface than ever reacts to form insoluble compounds of the nature of lime soap."

* * *

Germany Roofing Tile Machinery

Please tell me where I can get information as to concrete roofing tile machinery in Germany. A., Michigan.

We refer you to R. H. Baumgarten, No. 1 Laleham Road, Catford, London, S. E., who sent us a description in July, 1910, of a German tile made of concrete from molds patented by Otto Schuessler, Stroeblitz, Germany.

We also refer you to Geo. Erdman, Hudson, N. Y., who controls the United States patents on a German machine which makes the Teutoburg tile.

* * *

Silo Underground

Can you give me some information about silos partially underground? I have an ideal location for building a silo so that it would be 8' or 10' underground on the side of a hill. P., Illinois.

We see no reason why a concrete silo should not be built at least partially underground, if care is taken in the construction of the walls so that there is not undue pressure against them from the outside.

We think you will be interested in an article which appeared in the June, 1911, issue of CONCRETE, illustrating and describing a silo built in Ontario. This is partly on a hillside as you see in the picture.

* * *

Roofing Experiment

I propose trying a roofing experiment. I had thought of putting on cement plaster on an old shingle roof, troweling on the plaster directly over the old shingles without using any reinforcement. What suggestions can you offer along this line? P., Pennsylvania.

We cannot recommend the roof construction which you propose unless you use a metal fabric over the old shingles.

We suggest that you put on strips up and down over the roof about $\frac{3}{8}$ " thick and to these strips attach your metal mesh then put your concrete on about $\frac{3}{4}$ " thick. Before you do this, however, be sure that the supports for your roof, which we suppose were intended only for a wooden roof, are strong enough to bear the weight of the concrete; $\frac{3}{4}$ " of concrete will make a roof heavy, and frequently shingle roofs are not planned to stand this weight.

Clinker Concrete

Is concrete made of clinker as good as that made of rock? M., Ohio.

We refer you to an article, page 52, in the December, 1911, issue of CONCRETE. This reports the tests made by Marquette University, Milwaukee, Wis., on clinker concrete. The tests tend to show that good clinker concrete gives a stronger crushing strength than ordinary gravel concrete, and that good clinker concrete is almost as good as the best gravel concrete. The tests show that good clinker concrete is superior to cinder concrete. The tests have not been carried far enough to show that its use is warranted in reinforced concrete. Much depends upon the quality of the clinker.

* * *

Crazing

I have been making porch columns out of white Portland cement and white Illinois sand, mixed 1 part cement to two parts sand and have tamped the mixture into the molds. I have been greatly bothered by hair cracking. What shall I do to prevent this? R., Ohio.

Crazing or hair cracking in concrete surfaces may almost always be avoided by exercising proper care in curing concrete products.

We suggest that in making your porch columns, you construct some sort of a circular frame, something like a guard which is put around a tree. Cover this with burlap and keep the burlap wet for several days. We are confident that in this way you will avoid this crazing, if you also take care that the columns are not placed in drafts, while curing.

* * *

Concrete Block Factory

We manufacture hollow concrete block and we are going to put up a building for ourselves 25'x100', one story and basement, but we want to build so that another story can be put on later. Will concrete block or reinforced concrete be best for our building? V., Idaho.

An off-hand answer to your question would be that block construction probably will be very satisfactory for the one story building, and if the foundations are made solid the other store may be added later on. It is impossible for us to say, though, how thick the walls should be, or whether or not reinforced concrete will be better than block construction, because you do not tell us for what purpose the building is to be used. We suppose, since you are in the block business, that the building which you propose erecting is for your block factory, and we see no reason why ordinary 8" block would not make a construction strong enough for this purpose. Everything depends, however, upon the weight which you intend putting upon the walls.

* * *

An Unsuccessful Roof

A year ago we put up a concrete block flat building with gravel roof. Wet spots appear on the ceiling of the second floor to such an extent that the water drips off. We are unable to account for this condition. R., Wisconsin.

We are unable to say just what may be wrong with your gravel roof. You do not tell us very much about the construction and you give us no idea as to whether the roof leaks or whether the moisture which drips

down on the second floor is due to condensation on the under side. If the roof is very thin, the under surface over the living rooms is apt to be cold in cold weather, and the atmosphere will be quite warm and contain considerable moisture. This warm moisture-laden atmosphere coming in contact with the cool under side of the roof, is likely to cause condensation, and the only remedy for this trouble that we know of is insulation of the roof so that the temperatures are more evenly balanced. This can be brought about by having an air space between two thicknesses of roof construction.

* * *

Building a Cistern

I am going to build a cistern 6' wide, 6' high and 20' long with 4' of the height above ground. How thick should the slab be made and how should I reinforce it and how should I make the top of the cistern? B., Pennsylvania.

We refer you to an article published on page 48 of the March, 1912 issue of CONCRETE, on building concrete cisterns.

More particularly we call to your attention the drawing appearing on page 49. We suggest that you study the slab construction and reinforcing.

If your cistern is to be built 4' out of the ground, theoretically, only that portion of the cistern wall should be reinforced which does not have the support of earth behind it, but in a cistern which is only 6' deep and 2' in the ground, we suggest that it may be advisable to construct the cistern as though it were entirely out of the ground, and reinforce it accordingly.

We are confident that the information you want is already contained in the article to which we refer.

* * *

Lighting Posts

I should like some information as to concrete posts for lighting installations. Will you refer me to articles on this subject? Would such posts be too expensive for a small suburban village? F., Massachusetts.

We are certain that concrete posts will be very satisfactory for this purpose, and that the cost will not prove excessive—in fact, concrete posts are made much more economically and installed just as economically as ornamental metal posts of equal attractiveness.

In the December, 1910 issue of CONCRETE, an article on the use of such concrete posts was published, and we suggest that you look up an article published in the June, 1911 issue of CONCRETE, describing the manufacture of the concrete posts used by the Lincoln Park Board in Chicago. Still more recently we refer you to an article published in the April, 1912 issue of CONCRETE, describing the posts built for the campus of the University of Washington, Seattle. Cost, data and construction details are fully shown.

* * *

Concrete Foundation

I propose pouring a concrete foundation for a two-story house, using the clay wall of the excavation for the outside form and wood forms for the inside. The wall will be 12" thick. Will it be necessary to pour it all in one day or can I do it a little at a time? If I let the foundation stand until

next spring before building the house will the foundation be injured by the exposure? W., Kentucky.

It will not be necessary for you to pour your foundation walls all in one day, but we suggest that the best results will be obtained if you do not allow long intervals between the pourings.

We suggest that you begin to pour going clear around the wall with a layer of concrete and back to the starting place, and keep it up every day while it is possible to work, until the job is done. To make sure that the concrete placed each day bonds properly with the concrete placed the previous day, we suggest that you be very careful, inasmuch as you are depending upon the clay soil for an outside form, and see that this soil does not cave in on your concrete. The concrete surface should always be clean if a good bond is to be obtained.

We feel sure that the 12" foundation will be thick enough for the two story house which you propose building, but we suggest that you make some provision in the way of footings, which you do not mention. These should be wider. Much depends upon the nature of the soil upon which you are building. You do not tell us what kind of a house you propose erecting on top of this foundation. Exposure does not injure concrete after it is hard.

* * *

Workingmen's Houses

I am interested in the problem of the workman's house and I should like to be referred to information which you have published along this line and to names and places connected with such enterprises. C., Illinois.

We refer you to articles published in CONCRETE as follows:

July, 1910, containing a description of houses built of Pauly hollow concrete tile, at Youngstown, Ohio.

March, 1911, containing a description of concrete houses built for factory operatives at Ludlow, Mass. of concrete block.

December, 1910, containing a description of the Morrill houses at Virginia Highlands, near Washington, D. C.

June, 1911, containing a description of work at Gary Ind. with poured concrete houses and Reichert forms.

August 1911 as to houses by Van Guilder system for Eastman Kodak Co., at Rochester, N. Y.

January, 1912, containing further account of the work at Gary, Ind.

February, 1912, containing a description of houses being built near Scranton, Pa., for the Delaware & Lackawanna Railroad Co. by the Morrill system.

* * *

Stucco House

A man here wants to erect a cottage, using metal lath and stucco, a construction which we know very little about. We have tried to persuade him to use concrete block, but he does not want them. Please give us your idea of the construction which he proposes. Can you tell us any better way to put up a thin concrete wall than to use the

metal lath? How shall we give such a wall a rough pebbly finish? R., Iowa.

A better house can be built of concrete block than with concrete stucco on metal lath. It will be more solid and be warmer; and, as for the pebbly finish, a rough faced block may be used and the stucco put on in any finish desired.

However, many excellent houses are built with ordinary frame construction with furring strips put on over the sheathing, and with metal lath attached to the furring strips. Cement stucco is then applied to the metal lath usually in three or four coats. The first coat is a scratch coat and is pressed well over the metal lath to give a good bond, and besides to cover up the inside projections of the lath as nearly as possible. Over this, the body coat of stucco is put on to a thickness of about $\frac{1}{2}$ ", and if a pebbly finish is desired the last mixture should contain large pebbles and be made sticky enough in consistency so that it will adhere to the body coat when thrown on with a paddle. This construction is very common in some parts of the country. Our book *How To Use Concrete* tells just how concrete stucco is applied and what mixture should be used. It sells for \$1.00.

* * *

Licenses for Concrete Contractors

Will you give me the names of cities or towns which have passed city ordinances requiring all cement contractors to give a bond to the city and to secure a license. Cheyenne, Wyoming, has passed such an ordinance. The license costs \$25 and the bond required is \$1,000. This was done to protect the honest concrete worker. T., Wyoming.

We referred your inquiry to Richard L. Humphrey, president of the National Association of Cement Users. Mr. Humphrey writes that he has no knowledge of any city where such an ordinance is in force. We shall be glad to hear more about your ordinance.

Since writing the Wyoming subscriber who sent in the above inquiry, CONCRETE has received another letter from him in which he says that the reason for the adoption of a city ordinance in Cheyenne, Wyo., requiring a license of concrete contractors and also requiring them to furnish a bond, is to keep out the irresponsible contractors. The correspondent says:

"In the last few years several would-be contractors came to Cheyenne without reference or responsibility and engaged in the concrete business, and these would-be contractors have secured quite an amount of work from a class of people who think anything bearing the name of 'concrete' should be first-class. These would-be contractors have ruined the prices and they have caused a great deal of bad work, greatly to the detriment of the honest contractors who are prepared to do good work. I am sure that other cities have similar ordinances in their building departments, and I am informed that one of these cities is Pueblo Colo., and that Chicago has a similar provision. I believe that every town and city in the United States should pass an ordinance similar to this. The plumbers and drain layers are under similar regulations here."

CONCRETE will be glad to hear as to similar laws in other cities.

(Continued on page 60)

Concrete Block Makers Should be on the Safe Side

The "safe side" is the use of **IDEAL** machines and **IDEAL** equipment, as adopted by thousands of successful **IDEAL** customers in every section of the country.

IDEAL machines are mechanically perfect, producing a product exact in measurement, artistic in design, thereby winning the favor of the architect, contractor, mason and the building public.

IDEAL machines are built on lines of greatest possible simplicity, cutting down labor cost, but securing the highest output.

IDEAL machines and equipment can be installed for either hand or power tamping; the machines are built with a solidity that permits of either use. This makes it possible to start carefully and with a small investment and permits a gradual building up of the business with **IDEAL** equipment to meet increased trade demands.



The Chicago, South Bend & Northern Indiana Railway Interurban Station in Elkhart Ind., constructed with "Ideal" blocks.

We can outfit a plant according to amount of capital to be invested

Send for our literature; free for the asking. Check off in list of **IDEAL** line what you are interested in, and we will send you a lot of interesting information.

Our new combined catalogue and concrete encyclopedia explains fully the possibilities of **IDEAL** concrete construction. It should be in the hands of every man interested in concrete. Send \$1.00 and get this 160-page book of information, and when you send an order amounting to \$10.00 net or over, you will receive a credit of \$2.00.

Part of the Ideal Line

Block Machines—hand and power tamp.
Brick Machines—hand and power tamp.
Dimension Stone Machines.
Automatic Power Tamping and Scraper and Finisher.
Batch and Proportioning Mixers.
Curbstone Machines.
Spanish "S" Roof Tile Machine.
Ornamental Molds.
Tycrete Waterproofing Compound and Tycrete Colors.
Sewer and Drain Tile Molds.

If it is made of concrete we make the machinery to make it

Ideal Concrete Machinery Co.

Canadian Plant: 211 King St.,
London, Ontario.

South Bend, Ind.

Export Office:
8-10 Bridge St., New York.

(Continued from page 58)

Coloring Concrete, Etc.

Please give me some information about the use of coloring matter in concrete block.

We should also like some information as to how to keep water out of basements.

Will concrete block 8"x8"x24" be heavy enough for the wall of a large building 23' high, if the block are mixed 1:6? C., Oregon.

The use of coloring matter in concrete is something which can hardly be covered in a letter. We suggest that you write to advertisers in CONCRETE and ask for information. The book, *How to Use Concrete*, which can be supplied by the Book Department of CONCRETE for \$1.00, tells how colors should be mixed for concrete and in what quantity.

Referring to your inquiry about keeping water out of basements we refer you to an article which appeared in the January, 1912, issue of CONCRETE, page 33. It is a very practical article on how to make leaky basements watertight. It is a subject which cannot be covered in a few words. The conditions to be met are different on almost every job.

We are sorry we cannot advise you as to the use of 8" x 8" x 24" block for the building which you say is to be 23' high. The proportions in the mix of concrete do not determine the strength of the block. Much depends upon the nature of the material used in the mix, the way the block are made, and the way they are cured. The strength of concrete block depends upon many conditions. Anyway, you do not tell us what this building is for nor how much weight the walls will have to stand.

* * *

Concrete Floor in Paint Shop

Is it desirable to put a concrete floor in the paint shop of an automobile factory? I have heard that such a floor is likely to be too dusty for a paint shop.

Do you know of any paint or oil to apply on concrete floors so that dustiness will be prevented? C., New York.

There is no objection whatever to a concrete floor in such a place if the floor is properly laid.

Concrete floors are dusty sometimes because the top coat is trowelled excessively and because this top coat contains too much fine material. Trowelling brings fine particles to the surface and also has a tendency to bring the cement itself to the surface, separating it from the coarse aggregate in the concrete. Cement is merely the binding material and the stone should be depended upon for the wear. It is advisable, therefore, to keep as much stone on top as possible, and in careful floor construction we know it is possible to have 90 per cent of the surface of the concrete floor composed of the stone in the aggregate. This is frequently done, nowadays, by putting down the floor all in one pour, not having the mixture sloppy wet, as is sometimes done, and in smoothing off the floor with a wooden float instead of going over it repeatedly with a steel trowel.

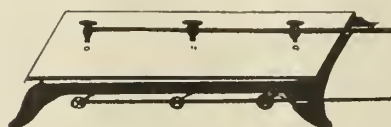
Dusting is also prevented by several applications of sodium silicate and water (water-glass), leaving a few hours between each application. This has tendency to fill up the pores and to harden the surface of the concrete, thus preventing dusting.

We strongly recommend that you see the advertising pages of CONCRETE for floor coatings.

A Miniature Steam Curing Apparatus Satisfactory

Little drops of water,
Little waves of heat,
Make a little steam room
That cannot be beat.

It sounds very frivolous, but CONCRETE is advised by J. S. Mitchell & Sons, who have a small block plant at Beaver Falls, Pa., employing a simple device that didn't cost \$5.00 to install, that they are able to cure their block in a very satisfactory manner. The output of the plant for three men is about 250 block



per day. These are racked up in a paper lined steam room, 10' x 20' x 7' high. The plant is piped for city water and for gas and has a three-burner gas plate, over the burners of which is a 3/16" sheet of iron. Steam is made by dripping water from three petcocks over the centers of the burners. The proprietors say that by lighting the gas under the iron plate and turning on the water, it is possible to create an atmosphere so saturated with steam in ten minutes that it is impossible to see the distance of a foot. There are two of these rooms in the plant, and when work is finished at 5 o'clock in the afternoon, the curing apparatus is started in operation and the block left until the next day. The next day's output of block can be put into the other room and the hot plate moved into it at 5 o'clock. It is said that the block made by this system are entirely satisfactory in every way, although it is impossible to use this apparatus in the coldest weather. Aside from the value of this suggestion for the block maker operating in a small way, it does not seem unlikely that the idea may be useful carried out perhaps in a slightly different way, in curing special pieces of concrete in small rooms, or under hoods, when it is not convenient to remove such pieces to regular curing chambers.

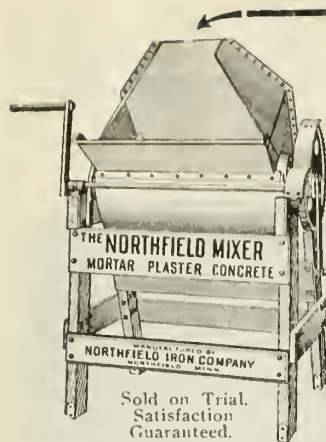
British South Africa.

(From Consul General Richard Guenther, Cape Town.)

The total importations of cement into the Province of the Cape of Good Hope and into British South Africa for the year ended December 31, 1910, by countries of origin, were as follows:

Imported from—	Via Cape of Good Hope.		Via all ports.	
	Pounds.	Value.	Pounds.	Value.
United Kingdom	57,954,127	\$163,407	149,575,341	\$446,409
Belgium	4,210,000	10,380	30,130,744	94,702
Denmark	79,600	214	2,827,600	8,867
Germany	884,000	2,346	12,661,044	49,521
Norway	160,000	389	160,000	389
Sweden	1,200,000	2,773	1,200,000	2,774
United States	12,000	219	20,000	277
Total	64,499,727	\$179,728	196,574,729	\$602,930

The landed cost and the selling price of cement at Cape Town are approximately as follows: British, costs \$2.43, sells \$2.67; Belgium, German and Swedish, costs \$2.13, sells \$2.37. Portland cement is being manufactured in the Transvaal, but owing to the unusual demand for building materials, growing out of the location of the executive branch of the government in Pretoria, the supply available from South African sources is quite inadequate. White Portland cement is practically unknown here.



Conservative Capacity
Ninety Cubic Yards
Per Day.

Saves you 60 to 90 cents on every yard. Pays for itself several times each season. Gives you the edge on your competitor. New Principle. Most thorough mix ever produced. Is not a man-killer. Two men operate it easily and do not work as hard as the shovelers. Pump engine will run it.

Simple, Light, Handy,
Substantial.

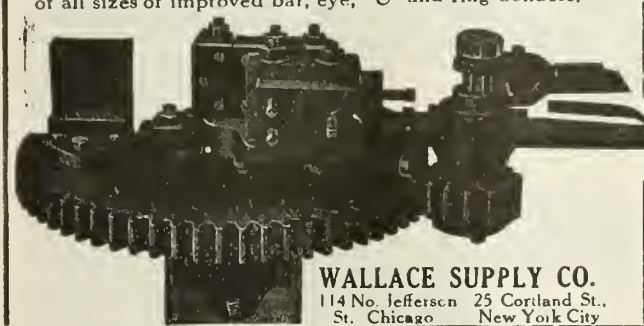
Write direct to factory for Catalogue, Price and Terms.

NORTHFIELD IRON CO.
406 Water St.,
Northfield, Minn.

THE NORTHFIELD MIXER
MORTAR PLASTER CONCRETE

Sold on Trial.
Satisfaction
Guaranteed.

The Auxiliary Ratchet Lever: insures more Power, than the ordinary one lever bender. Our BAR BENDER No. 5 is specially valuable in Reinforced Concrete work. Portable, instantly adjustable to all shapes of stock up to 1½". Send for booklet of all sizes of improved bar, eye, "U" and ring benders.

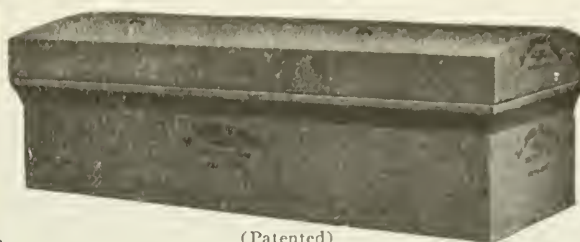


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25 Cortland St., New York City

The Automatic Sealing Vault

always wins favor because it is so practical and proves itself superior. The AUTOMATIC SEAL and its neat appearance has made it the MOST POPULAR and generally satisfactory vault known today. Provides an all-the-year-round income with constant increase.

More Beautiful Than Stone or Steel.



(Patented)

As Enduring as the Ages.

Adjustable Steel Molds made of Bessemer Sheet Steel make your business permanent at a nominal cost.

Our illustrated catalogue fully describes both vault and molds and other devices which will interest you.

The Automatic Sealing Vault Co.

PERU, INDIANA

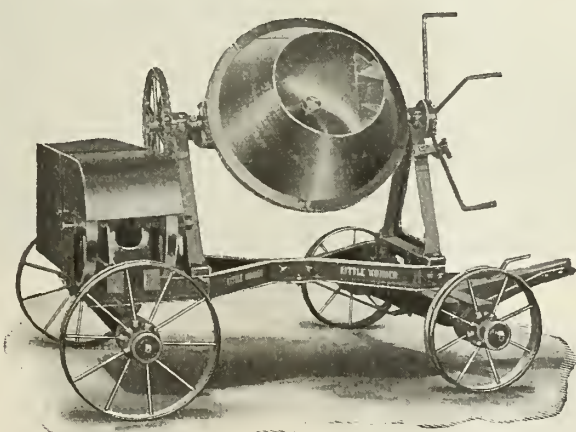
Note.—Our A. S. V. Waterproofing Solution in five-gallon cans at \$1.00 per gallon will do the work.

Put this Concrete Mixer on your own work for **TEN DAYS' FREE TRIAL** under our "Man to Man" Proposition. We pay the freight both ways in case you don't buy it.

THE

LITTLE WONDER

"The Small Job Money-Maker"



DER sets a standard of money earning capacity by which all small mixers will in future be judged.

The LITTLE WONDER eliminates paddles, small parts and cumbersome hoppers, also break-downs, tinkering and loss of time. It will mix a batch in less than a minute at a cost for gasoline of about one cent per cubic yard, and has a capacity of 25 to 35 cubic yards per day.

The LITTLE WONDER is so strong and durable and has so few parts, that with decent care it will last a lifetime. The drum has no sharp corners in which cement can collect—no movable parts in the drum; it is charged on one side and discharges on the other, direct into wheelbarrows or forms without stopping the engine.

Our "MAN TO MAN" Proposition

It's at the top of this page. Read it again, then write us quick. There are no conditions—no strings tied to this offer, we take all the risk. WE know what the LITTLE WONDER will do. We want YOU to know if you're in business to make money. Address:

WATERLOO CEMENT MACHINERY CORPORATION
105 VINTON STREET, WATERLOO, IOWA

Manfrs. Concrete Mixers, Concrete Spreaders, Builders' Hoists and Elevators, Block Machines and Cement Tools. Send for Catalogue.

Factory-Made Concrete Curb Used Extensively in Pittsburgh

The field of the concrete products manufacturer is getting broader because ideal concrete may be more nearly approximated under factory conditions than under circumstances which are frequently haphazard in the field. It is possible in the factory to maintain standards more thoroughly and to give to each piece of work the rigid inspection which it is not always possible to give in the field. Of course, conditions in the field are bound to improve as engineers and

electrically welded to the angles. This company has sold the city of Pittsburgh more than 20,000' of this curb, and is making an effort to have the city adopt the curb as standard. A section view is shown on this

(Continued on page 64)



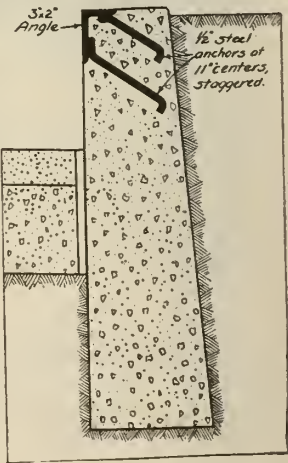
Curb Factory

contractors are able to standardize field practice, and at the same time, the concrete products manufacturer is constantly discovering opportunities to increase his profits by adding to the variety of his products.

There has been great progress in recent years in the construction of concrete curbs and gutters in place, yet the Neville Concrete Co., Neville Island, Pittsburgh, Pa., has built up a market for a concrete curb in three sizes, all made in 5' lengths and protected at the wearing corner with an angle iron which is anchored into the curb by means of rods which are



Another View of Plant



Concrete Curb and a Section View

Stop That Leak

With

"Anti-Hydro"

"Anti-Hydro" is the only positive and permanent water-proofing material in the market. It is a liquid which makes cement water, dust and acid proof. It will overcome the most difficult waterproof engineering problems, and has never failed to produce an absolutely tight surface. Because of its acid-proof qualities, it is especially adapted for use on floors in laboratories, factories, etc., where acids are freely handled.

L. J. Buckley & Co.

General Sales Agents,

256 Broadway, New York City, N. Y.



AN EDWARDS INTERLOCKING METAL SPANISH TILE ROOF

WILL OUTLAST YOUR BUILDING

Artistic and Ornamental in appearance and is positively guaranteed to be Fire, Lightning, Rain, Storm and Wind proof.

Its extreme lightness (about one-eighth that of slate), durability and moderate cost commend it to those wishing something out of the ordinary in roofing.

Manufactured from best quality Worcester Grade Terne Plate, furnished painted or galvanized (galvanized after formation) size 10 x 14 inches.

The Edwards Manufacturing Co.

"THE SHEET METAL FOLKS"

404-444 Eggleston Ave., CINCINNATI, OHIO

The World's Largest Manufacturers of Metal Roofing, Metal Shingles, Metal Ceilings, Etc.

Send for New Free Roofing Book showing our complete line of Metal Roofing, Siding, etc.

CONCRETE FENCE POSTS

Are Supplanting Wooden Posts.

ARE USED BY THE U. S. AND FOREIGN GOVERNMENTS, BY ALL LEADING RAILROADS AND INTERURBANS AND ALL PROGRESSIVE FARMERS. WHY DON'T YOU MANUFACTURE AND SELL THEM?

In order to get the greatest strength with the least amount of material, we have found after experimenting that the T shape gives the highest tests. Our seven-foot molds make a post 7' long by 6½" x 6½" at the bottom, tapering to 4½" x 2½" at the top. The finished posts weigh between 75 and 80 pounds. They can be made and sold at a profit and compete with the prices of wood posts. Our molding machines are being used by the leading railroads, by the U. S. Government, and we ship to all parts of the world.



Battery of 30 molds. Two top sections are emptied and end frames thrown back on hinges. Nothing removed from car but posts and molds. Many sizes of machines and molds. Every one is guaranteed. Write us at once.

MOST PRACTICAL AND ECONOMICAL SYSTEM ON THE MARKET

OHIO POST MOLD CO.

1341 Nicholas Bldg., Toledo, O.

Write for our
CATALOG
at once

CONCRETE FENCE POSTS

Are Better Than Wooden Posts.

We can furnish you with any length or kind of mold. Our system of making posts absolutely minimizes the labor cost. We can make any size of machine and guarantee every one that leaves

our factory. Our business policy is not to sell territory or one machine, but to help you build up a trade on concrete fence posts so that it will be profitable to you, to the farmer and to ourselves. Write for our free catalog.

OHIO POST MOLD CO.

1341 Nicholas Bldg., Toledo, O.

(Continued from page 62)

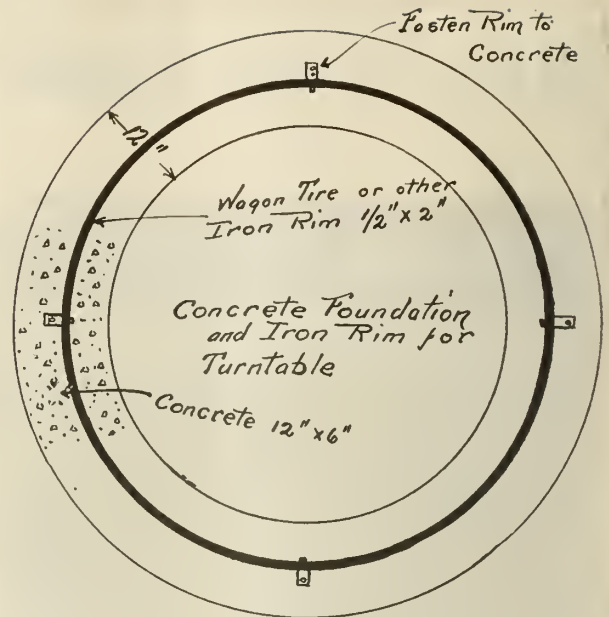
page and illustrations are also presented which show the factory of the Neville Co.*

The sizes in which the curb is made are as follows: 6" x 24" for block paved streets under heavy traffic; 6" x 21" for brick or asphalt paved streets under heavy traffic, and 5" x 24" for block paved streets under light traffic. The angle used to protect the corner is 3" wide on the vertical, exposed face of the curb and 2" wide on the top. The anchors are of $\frac{1}{2}$ " diameter rods, placed 11 $\frac{1}{2}$ " on centers and extend back very nearly to the opposite face of the curb. At the ends, the sections have mortise and tenon joints, so that when placed in position, the sections are locked securely. This curb in Pittsburgh costs 41c per linear foot for the 5" x 21" size and 48c per linear foot for the 6" x 24" size.

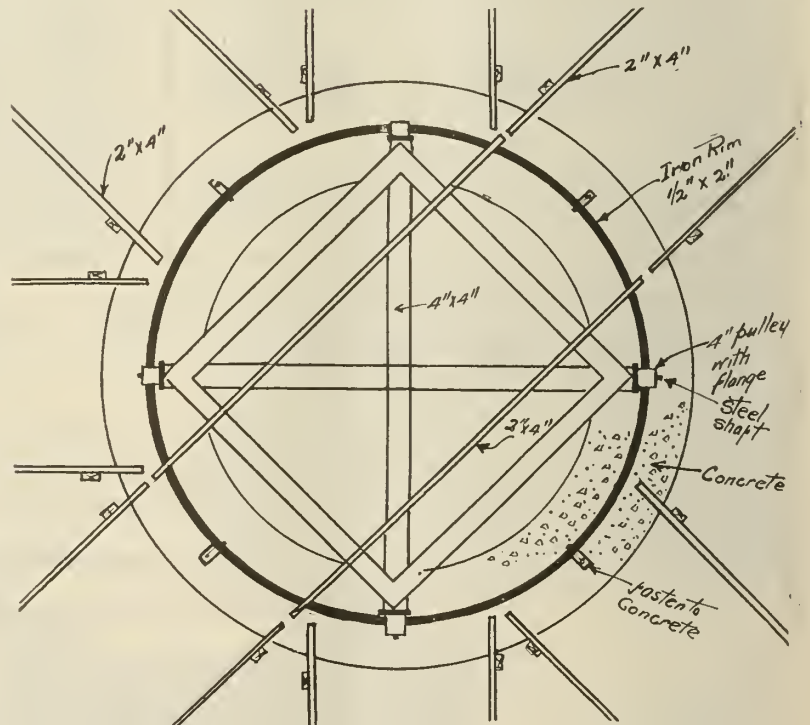
Turntable in a Concrete Products Factory a Time Saver

The drawings on this page are self-explanatory. The idea comes from J. L. Johnson, Hereford, Texas, who makes concrete block and tile. Mr. Johnson finds it a great advantage to be able to move his block cars around wherever he happens to want them without making such frequent use of transfer tracks, as is ordinarily necessary in a concrete products plant, so he devised the turntable, which he sketches. He first made a circular foundation 12" wide and 6" thick of concrete. On this and anchored down by iron straps and bolts into the concrete, is the rail on which the turn is made. In this case it is a wagon tire 2" wide and $\frac{1}{2}$ " thick; 4" pulleys on steel shafts, mounted on a frame work of 4" x 4", and 2" x 4" timber support the two pieces of track on which the car stands while being turned. Mr. Johnson says that it was a simple thing to construct and that he finds it of great advantage in his factory.

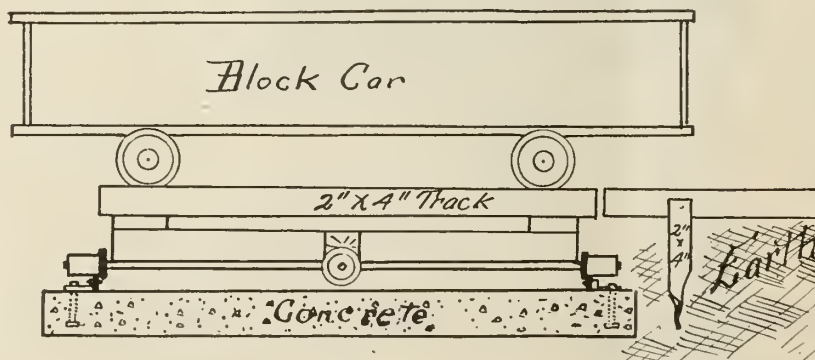
*Illustrations are presented through the courtesy of the Universal Portland Cement Co.



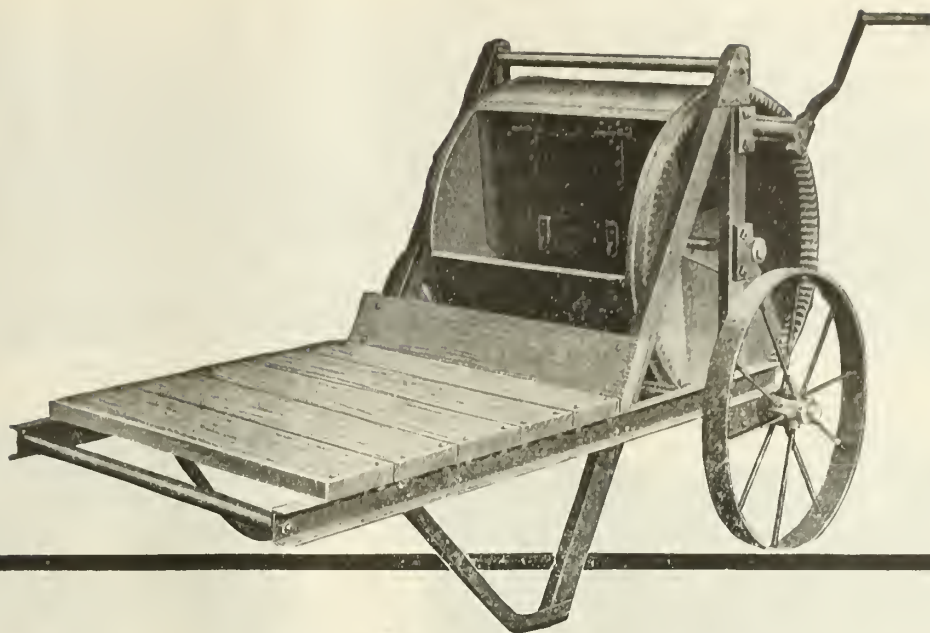
End of Plan



Plan of Turntable



Section of Turntable



Why Take a Chance on Crude Methods of Mixing Concrete?

Lay down your shovel and look around you. No matter how small the yardage, first class concrete is worth while; and first class concrete is impossible at prevailing prices, unless mechanically mixed. The old shovel and hoe methods are obsolete—they don't pay. But surplus capacity and weight, cost of operating, erection and haulage make a power mixer unprofitable on the small job. There's *no escape* either way. The progressive contractor **MUST** use the

SMITH HAND MIXER

It is a batch mixer with a capacity of $2\frac{1}{2}$ cu. ft. — a thoroughly tested machine, guaranteed to mix in *three turns* of the drum — a **MIXER** capable of reliable service under long, hard service — a **REAL** mixer backed by the best and oldest firm of mixer builders in the U. S. This machine will improve your work and increase your income at the same time.

Write for our special Smith Hand Mixer proposal and booklet No. 10

The T. L. SMITH CO.
1326 Majestic Building, MILWAUKEE, WIS.

CHAS. L. KIRK
1739 Liberty Ave.
PITTSBURG, PA.

CHICAGO, ILLINOIS
OLD COLONY BLDG.

M. S. SEIBERT & CO.
605 Wyandotte Bldg.
COLUMBUS, OHIO.





SOME CONCRETE PRODUCTS

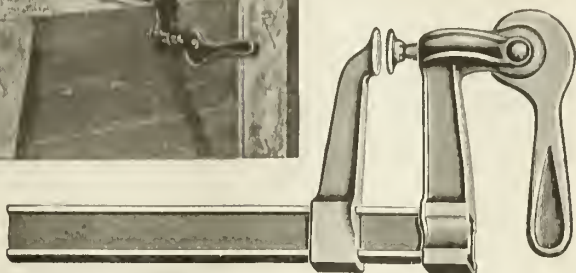
Farm building on estate of O. C. Barber, Barberton, O., built of Ideal concrete block, with partial veneer of brick.

Garage at Reading, Pa., built of Hobbs broken ashlar block made by the Art Cement Block Co.

Concrete lighting standards made by the Pettyjohn Co., Terre Haute, Ind.

Residence of O. C. Barber, Barberton, O., built of Ideal concrete block and concrete dimension stone with partial veneer of brick.

CLAMPS For Forms



No matter whether you are erecting forms for a reinforced concrete skyscraper or are building concrete steps in wood molds in your plant, the easiest, quickest and cheapest method of securing the forms in place is to use Colt's clamps. Wiring takes time and results in shaky forms. Nailing is expensive and injures the lumber. Clamps hold the forms rigidly in place, are quickly removed and leave the centering available for future use.

Our clamps are made with long arms and short arms, with screw action and eccentric action. All are quick and positive.

Our clamp catalog describes their use and also illustrates wood clamps for carpenters, cabinet makers, etc. Write for a copy of Catalog No. 2980.

HAMMACHER, SCHLEMMER & CO.

Hardware, Tools and Supplies.

84th Avenue and 13th St.

New York, since 1848.

ECLIPSE CONTINUOUS MIXER

Made either in stationary or portable types, with either two or three hoppers. Has accurate force feed measuring and proportioning devices.

Can be equipped with any kind of power. Capacity is adjustable from two to seven yards per hour. Prices extremely low.

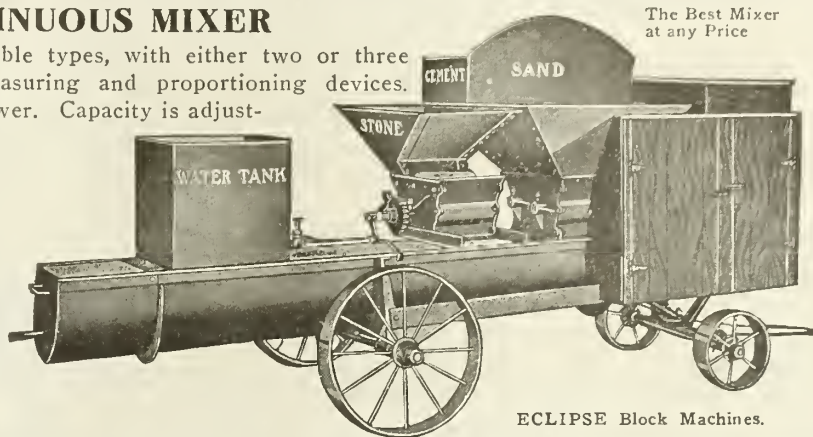
Write for Catalog No. 24M, and if interested in a stone machine, write for Catalog No. 20A.

It is better to buy an ECLIPSE than to wish you had.

George C. Christopher & Son

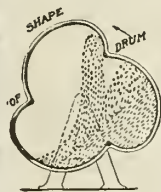
WICHITA,

KANSAS.



The Best Mixer
at any Price

ECLIPSE Block Machines.



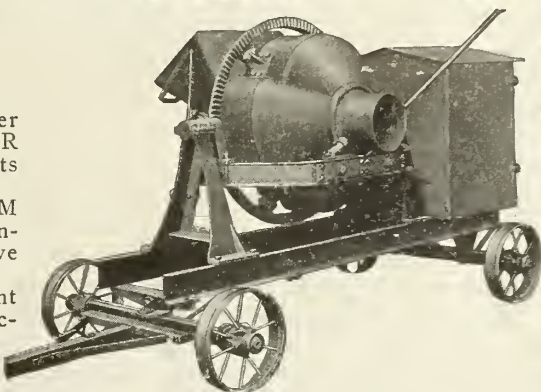
"CLOVER LEAF"

We urge the fullest comparison with other Mixers, not only to determine what the "CLOVER LEAF" will do, but also, that you may realize its superiority.

Ask us about our PORTABLE LOADING PLATFORM (Folding). It means dollars to Sidewalk Contractors and Foundation Builders; if looking for extreme PORTABILITY, we have it for you.

Our latest Catalog reveals unusual Mixer and equipment values; it will pay you to ask for it; write, and let us get acquainted.

The **"CLOVER LEAF"** Company, South Bend, Indiana



LET THE **IMP** DO YOUR
WATERPROOFING

"PATENT APPLIED FOR—TRADE MARK REG. U. S. PAT. OFF."

IMPERVITE INTEGRAL
WATERPROOFING
COMPOUND

Impervite differs from other waterproofing-compounds in that it contains NO SOAP.

Ask us to explain this fact in detail: it will surprise you.

The German Government proves Impervite unequalled.

The U. S. Bureau of Standards finds Impervite the only material to prevent ELECTROLYSIS of concrete.

Stucco Houses can be guaranteed waterproof and free from hair-cracks, by our method.

Send at once for Book

The STANDARD PAINT COMPANY
(MFRS. OF RUBEROID ROOFING, P. & B. PAINT, Etc.)
100 WILLIAMS STREET, NEW YORK

New Equipment, Methods and Materials

In this department the Editors endeavor to keep our subscribers informed upon new tools, methods, machines and materials used in this industry. It is in no sense a department for the benefit of advertisers. To secure attention the thing described must be new to our readers. No matter will be printed simply because an advertiser desires it. Likewise, no matter will be excluded simply because the article described is not advertised in this paper. We aim to keep our readers informed—suggestions for the improvement of this department are solicited.

Tests on "Impervite"

Tests carried out by the American and the German government on "Impervite,"* indicate that this material possesses unusual advantages as a waterproofing means and as a preventive of electrolysis in reinforced concrete. In Germany, tests were made of the material in competition with a soap waterproofing compound. A 1:3 mortar was used equally in the comparative tests, containing $1\frac{1}{4}$ per cent of Impervite and of soap compound, based on the total weight of cement and sand used. The percentage of soap compound incorporated was somewhat high.

In tests for tensile strength, Impervite developed 15 per cent more than the soap compound, while in the permeability tests it offered more than twice as much resistance. In practice, the manufacturer states that as high as 10 per cent of the compound may be used, without impairing strength of mortar or delaying set of cement.

A suggested field of wide applicability and advantage for the compound, which is in the form of a bituminous paste, is in the prevention of electrolytic action on the metal used in reinforced concrete. Recent tests conducted by the United States Bureau of Standards in this connection give some interesting results. A 1:2 $\frac{1}{2}$:4 concrete was used in the tests, treated with 10 per cent Impervite, the test pieces being wholly immersed and subjected to the passage of a 110-volt current for four months. While under observation, the passage of current varied from 0.0005 to 0.0010 amperes. At the conclusion of the tests the blocks were sawed open and the iron test rods embedded in them were found in perfect condition.

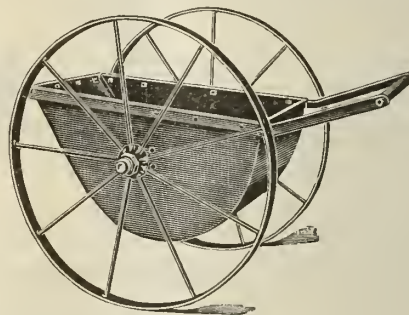
One of the advantages claimed for the material by its manufacturer is its absolute insolubility after the mortar has set. Its resistance to the action of hot and cold alkaline and saline fluids is noteworthy. On this account, it has a large field of use in concrete stucco, which, because of its exposed location, is often susceptible to disintegration. Experiments indicate that lean mortars treated with Impervite can be made definitely waterproof and that they are free from the surface checks and hair-cracks noted in the richer mortars generally used in wall surfaces.

*Standard Paint Co., 100 Williams St., N. Y. C.

Concrete Carts for Contractors

Carts for carrying and depositing concrete form an important part of the contractor's equipment, since the ease with which concrete is placed depends to a large extent on the type of equipment used in transporting it. Three new types are listed by the Lansing Company, Lansing, Mich.

Cart K 1, which is illustrated, is so constructed that the bowl can be turned completely over, mak-



Concrete Cart for Flat Work

ing it especially convenient in large horizontal construction, like sidewalks, reservoir bottoms and floors. It holds six cubic feet and weighs 225 lbs.

Cart K 2 is fitted with a long nose, or spout, which is found convenient in dumping concrete into narrow or inconveniently placed forms and molds, delivering the load without slopping it over the front of the cart. It is 45 lbs. lighter than the K 1 type, but has the same capacity. Cart K 3 is 195 lbs. in weight, and has the six cubic feet capacity. It is so hung on the axle that it dumps easily.

We are the sole agents in United States, Canada and Mexico for

Meyers' German Cement and Liquid

For Patching All Kinds of Cement Work

We have a large stock on hand. Prices as follows:

1 Kilo Can	\$1.50
2 Kilo Can	2.75
4 Kilo Can	5.00
Barrel powder, 50 Kilos, per kilo.....	.80
Demijohn liquid, 68 Kilos, per kilo.....	.80

All prices f. o. b. New York City.

We also handle Dugan's Invisible Patcher for patching all kinds of Limestone and Bluestone.

MICHAEL COHEN & CO.

St. James Bldg., Broadway and Twenty-sixth St.

NEW YORK CITY.

Agents for the Southern States, Missouri, Kansas and Oklahoma:

The Vogt Tool Co., 910 East 19th St., Kansas City, Mo.

Agents for the Pacific Coast, Eccles & Smith Co., 71 First

St., San Francisco, Cal.

Agents for Chicago, Ill., and vicinity, Messrs. Brunner &

Lay, 570 West Polk St., Chicago, Ill.



Waterproof Liquid Coatings

made in colors to match all popular building stone and brick. Restores old surfaces to original freshness. Waterproofs and beautifies new Cement, Stucco or Art Stone.

CHI-NAMEL
Cementone

☛ Colors, Pure White and Colorless waterproofing liquid for exterior and interior use.

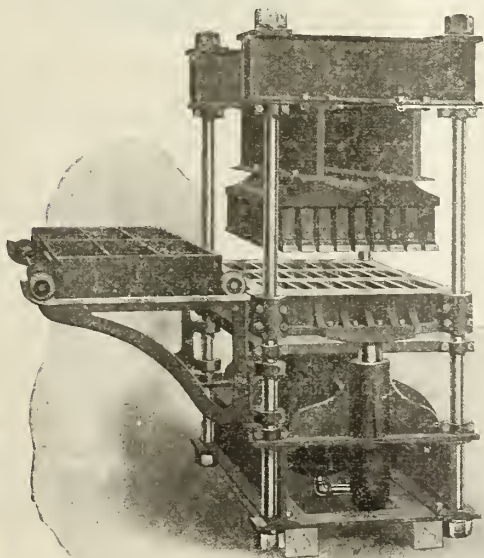
☛ Chinamel-Cementone Floor Enamel prevents dusting, stains and injury to cement floors.

☛ Send for our book of valuable information on Cement Waterproofing with color effects.

The Ohio Varnish Company
8667 Kinsman Road Cleveland, Ohio

Buckeye Hydraulic

• CEMENT BRICK MACHINE



The only successful power press on the market.
Makes 15,000 brick per day, under pressure of 200,000 pounds. We instal complete plants.
We also manufacture Mortar Mixers, Concrete Mixers and Gasoline Engines.
Write us for prices and particulars.

Buckeye Engine & Foundry Company
Joliet, Ill.



Mississippi State Hospital at Jackson, Miss.—Roofed with Asbestos "Century" Shingles by the Hospital authorities on the advice of J. T. Willis, Architect. From an Artist's Drawing.

SO many requests have come to us for a *red* Asbestos "Century" Shingle that could be supplied at a lower cost than the solid red shingles—that we are now producing *Veneered Red*

Asbestos "Century" Shingles

"The Roof that Outlives the Building"

These veneered shingles are made of the standard "Century" asbestos-cement composition—and by the "Century" process, controlled exclusively by this Company.

Their upper weather surface is Indian Red, backed with the regular Newport Gray composition.

They have all the fire-proof, weather-proof and time-resisting qualities that have given Asbestos "Century" Shingles their superior place among roofing materials.

They cost very little more than the Newport Gray Shingles.

Our nearest representative will supply you.
"Write us for Booklet "Keasbey 1912." "

Keasbey & Mattison Co.

Factors

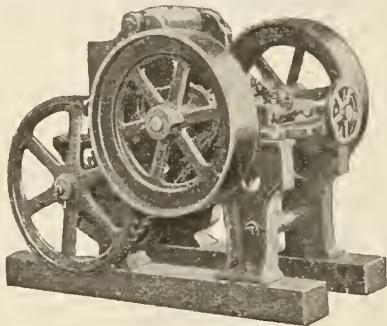
Ambler, Pennsylvania

Branch Offices in Principal Cities of the United States

Crushers for Concrete Materials

The hardest materials makes the hardest concrete, and since Nature has not been kind enough to supply hard rocks in neatly assorted sizes, most of them have to be crushed before they can be used. A new crusher is the one manufactured by the Henry Martin Brick Machine Mfg. Co., Inc., Lancaster, Pa. It is made in four sizes and consists of a jaw crusher and a hard iron roll crusher set beneath. The fineness to which material can be reduced is governed by a hand wheel and a wide range of sizes is obtainable.

Owing to their sturdy construction, these crushers can do heavy work, though the manufacturer states that a maximum capacity of 25 tons daily can



New Type of Crusher

be delivered from a crusher run with small horse power. Rolls may be set from $\frac{1}{4}$ " to $\frac{3}{4}$ " apart. In crushing from 1" to 2" material, the front portion of the hopper above the rolls is removed and chute inserted. The chain is thrown off in coarse crushing. The jaw plates, which are removable, are made of chilled semi-steel, as are the crusher rolls.

These crushers will reduce to the fineness of sand, or coarser grades if desired, materials like limestone, sandstone, ironstone, cobblestone, hard brick, soft brick, vitrified brick, silica rock, pebbles, gravel, granite and marble chips, pottery, shale, lime glass, oyster shells, coal, coke, cinders, plaster and so on. They are largely used for agricultural purposes, grinding everything from limestone for fertilizer to chicken feed.

Machine to Make 330 Sizes and Styles of Building Units

An ingenious piece of apparatus, invented by A. A. Houghton, Northville, Mich., is designed to mold different shapes of columns, balusters, lattices, piers and caps of concrete, to the number of 330. By a system of combinations of parts, and removable and adjustable cores, this wide range is accomplished. Ten styles of columns, balusters, chimneys and piers are listed by Mr. Houghton, three styles of capital and railing blocks, two styles of lattice blocks and

sixty-six sizes of building block, ranging from 4"x4" to 24"x24".

The machine and face plates are manufactured of clear gray iron and machined and polished to a perfect smoothness, afterwards being coated with a non-adhesive compound at the factory to prevent concrete from sticking. Five sets of plates—rock face 8" high, bevel paneled, rock face 4" high, O. G. cornice and plain—each molding sixty-six sizes, are part of the regular equipment. Mr. Houghton gives a strong five year guarantee with the outfit.

"Albany" Concrete Mixer for Contractors

A small and light, but strong, batch concrete mixer for contractors is being marketed by the Albany Hardware Specialty Mfg. Co., Albany, Wis. The supporting frame, of angle iron, is mounted on wheels for ease in transportation and the drum is of such size that the mixer will produce from 4 to 8 cubic yards of concrete per hour. The complete outfit, including gasoline engine for power and a

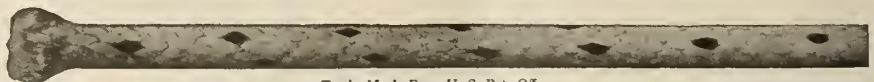


"Albany" Concrete Mixer

concrete cart, weighs about 2,200 lbs.; ready for shipping, it tips the scales at 2,500 lbs.

In operation, while the drum is in working position, that is, tipped forward toward the dumping crank, the operator introduces the required amount of water and by means of the dumping crank turns the drum back into loading position, where it is locked. In the meantime, the loader, having been supplied with the proper amounts of cement, sand and gravel, is tipped into the drum by the operator and returned for refilling. The drum is then swung forward into working position, and more water added, if required. After being mixed from 30 seconds to 1 minute, the batch is dumped into the cart and deposited on the work.

SAMSON SPOT SASH CORD



Trade Mark Reg. U. S. Pat. Off.

Made of extra quality stock, carefully inspected, and guaranteed free from all imperfections of braid or finish. Proved by both tests and long experience to outwear common cord or metallic devices many times over. Can be distinguished at a glance by our trademark, the Spots on the Cord. Send for catalogue and samples.

Samson Cordage Works, Boston, Mass.

The Popular and Superior Perfect Brick Machine

When you buy a Brick Machine, buy one that will please you. One that will last a life time, one that a 14 year old boy can operate. Buy the one that leads all others. Buy the one that is a Winner. Money-maker. The PERFECT

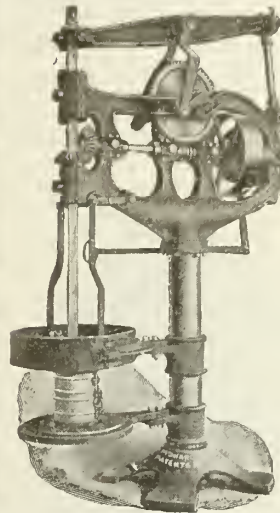
all steel. Nothing to break or wear out. Strictly guaranteed for five years. The only Adjustable Automatic Foot as well as a hand tamper on the market. Mfg. 10 brick at a time. Mfg. them face down. With each machine there are 50 pieces of extra fancy face plates, which includes a full set of rock faceplates as well as the ends. The 1912 model has a number of valuable improvements. Write for the 1912 catalogue and it will tell you all the rest of the good qualities which no other brick machine possesses. When you see the PERFECT operated you will be convinced that it has no Equal. The 1912 model is now ready for shipment and can fill all orders the same day I receive them. Ask for a copy and learn how to manufacture 12,000 PERFECT brick in 10 hours.



C. S. Wert

602 N. Main Street, Kendallville, Ind., U. S. A.

THE MORE A MAN KNOWS about machinery the easier it is to sell him a MONARCH TILE MACHINE



Monarch No. 1

and our supplies. The manufacturer who is on the market selling tile made with this machine is safe in bidding against any responsible bidder using other makes. He can sell his products at about what it costs his competitor to make them, and then make good money.

First in
SPEED
MATERIAL
DURABILITY
CONSTRUCTION
PERFECT
PRODUCTS

Write for our proposition.

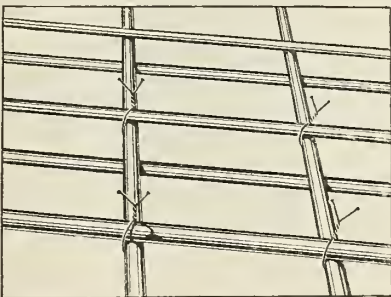
MONARCH MANUFACTURING CORPORATION

All Kinds of Cement Working Machinery

777 Cedar St.

ONAWA, IOWA, U. S. A.

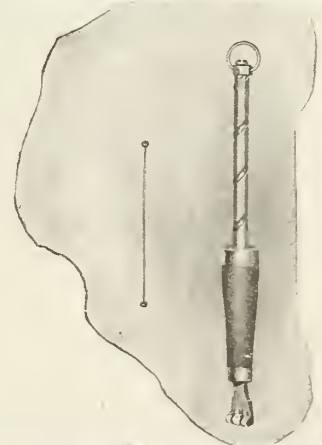
Safety, Economy and Speed in TYING REINFORCING STEEL IN PLACE



Ties made in lengths 3 in. to 9 in. The tie, with head at each end, and hand twisting tool shown in cut to right. One upward pull on handle of tool makes a complete and firm tie. Patent applied for.

The United Wire Tie Co.

Department E.
TOLEDO, OHIO



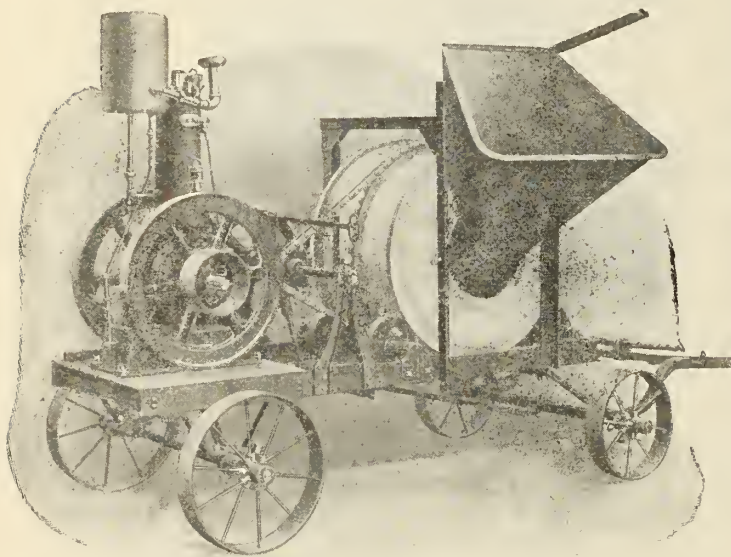
GENUINE BANGOR
Roofing Slate, Structural Slate, Blackboards
EAST BANGOR CONSOLIDATED SLATE CO.
Large Facilities EAST BANGOR, PA. Prompt Deliveries

STRONG COLORS FOR CEMENT
Red, Black, Buff, Green, Blue, etc.
C. J. OSBORN COMPANY 268 Water St.
New York, U. S. A.

Light Concrete Mixer That One Horse Can Move

A new type of mixer that has been placed on the market by the Chain Belt Co., Milwaukee, Wis., is "one horse" only in that a single horse can move it easily wherever it is needed for the day. It has been designed for the convenience of the contractor who has numerous and separated jobs of sidewalk laying and for the man in the country who has silo, floor and farm work to do in a community.

The firm has catalogued it under No. 00. It is operated by a three horsepower gasoline engine,



New Member of "Chain Belt" Family

water-cooled, or may be run by electric motor. It has a capacity of $4\frac{1}{2}$ cubic feet of loose materials, or $3\frac{1}{2}$ cubic feet of mixed materials per batch. The drum, like those in all Chain Belt mixers, is cast in two sections, of a special mixture of semi-steel. Mixing is accomplished by $\frac{1}{4}$ " steel mixing blades and malleable iron buckets inside the drum. Gears are not used, the driving being done by steel roller chain belt.

New Type of "Diamond" Expansion Bolt

An improvement in one-part anchor bolts has been perfected and is being marketed by the Diamond Expansion Bolt Co., 90 West St., N. Y. C., catalogued as "Diamond N" screw anchor. It is



"Diamond N" Anchor With and Without Screw

designed to retain the advantages of the regular type, with increased holding capacity and greater convenience in use.

The transverse ribs at the inner end of the shield are so arranged as to give a uniform and secure

bearing, gripping into the fibre of the material to which it is fastened and presenting a surface of contact greater than has been the case with older types. The longitudinal ribs at the outer end of the shield are placed in such a position as to bind in the wall with a driving fit when the screw is inserted. These ribs prevent the shield from turning when the screw is introduced. Owing to the fact that the maximum expansion is at the inner end, a number of cases are cited in which sections of wall have been pulled out with the shield when extracting it from the hole.

Combination of Concrete Machinery Manufacturers

An important merger is announced, through which the Miracle Pressed Stone Co., Minneapolis, Minn., and the Northwestern Steel & Iron Works, Eau Claire, Wis., have joined forces for the extended manufacture of concrete machinery and tools. This is the largest reported deal in the history of concrete machinery manufacture. Both parties to the consolidation are well known, and their products widely advertised. In combination they will form the largest company devoted to making concrete machinery.

For the last decade, the Northwestern line has been established and it is sold literally all over the world. The Miracle line consists of block machines turning out a unit with single or double staggered air space, two-piece wall block machines, brick machines, mixers, tile molds, ornamental molds and molds for cornices, chimneys, piers, burial vaults and so on. Both firms have a strongly established reputation for quality.

The consolidation of these organizations means a great deal to the concrete machinery industry. By it the scope of the two companies will be greatly enlarged, to the extent of doubling their entire output, with resultant low manufacturing cost.

Under the organization, the Miracle plant at Minneapolis will be abandoned and all machinery, stock and finished goods will be moved to the big plant of the Northwestern Steel & Iron Works at Eau Claire. CONCRETE extends its best wishes for the continued success of both companies under the merger.

Carborundum Not Yet Useful for Belting

Those elusive types, in a recent issue, read: "Carborundum grains, belts and wheels." This was a mistake and we are sorry. Carborundum, as most of our readers know, is an abrasive material, made by the Carborundum Co., Niagara Falls, N. Y. It has many important uses, but up to date has never been manufactured into belts, factory or feminine. We had no intention of misleading our readers in this connection and tender our apologies herewith. The expression should have been: "Carborundum grains, bricks and wheels."

Why Herringbone Lath

FOR ALL CLASSES OF WORK

Herringbone Expanded Metal Lath is now recognized by the best architects and builders as a type of metal lath that can be depended upon for all classes of work.

Herringbone lath gives maximum rigidity. Studs can be placed sixteen inches center to center, instead of twelve. Saves five cents a square yard on studding.

Herringbone lath insures a plaster coating of uniform thickness. Interlocking selvage edges are stiff and straight, forming a perfect joint, without waste from lapping.

Herringbone lath gives a flat surface to the trowel, instead of a cutting edge. Mortar completely envelopes lath, without undue waste, forming perfect and indestructible key.

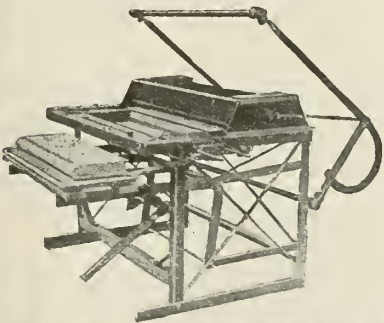
Also made of American ingot iron for work subject to the corroding influences of salt air, gases or acids.

Write Today for Free Booklet

dealing with the uses and advantages of Herringbone Expanded Metal Lath.

THE GENERAL FIREPROOFING CO., 46 Logan Ave., Youngstown, O.

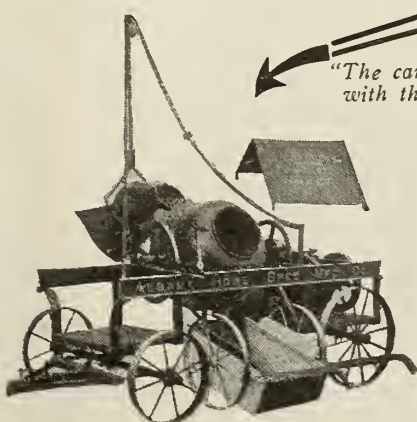
The RAMMER-PLAYFORD CEMENT STAVE MACHINE makes staves for the best silos, tanks, culverts and standpipes that can be built



With this machine, you can build a permanent, time-proof cement stave silo, better than a wood silo, at a lower first cost. And the first cost is the total cost. Staves made on this machine set up easily and are bound firmly in the wall of the tank, silo, well or culvert by $\frac{3}{4}$ -inch steel hoops.

We control exclusively the Rammer-Playford Cement Stave Machine and the Playford Patent Cement Stave. If you want to control the silo, tank and culvert business in your vicinity, we can establish you in a money-making enterprise. Ask for complete details now.

CEMENT STAVE SILO CO. - Des Moines, Iowa



*"The cart goes
with the mixer"*

ALBANY Concrete Mixer

With a capacity of 4 to 8 yards of concrete every hour (a batch a minute), the Albany Mixer will make money for any contractor. Steel frame, easily portable, easily charged, conveniently discharged, equipped with concrete cart, gasoline engine and friction clutch—these are some of the features that make this machine valuable.

Before you buy a concrete mixer, investigate the Albany. Get our circulars and prices—you can't afford to buy an inferior machine. If you'll say you saw this mixer illustrated in CONCRETE we'll appreciate it.

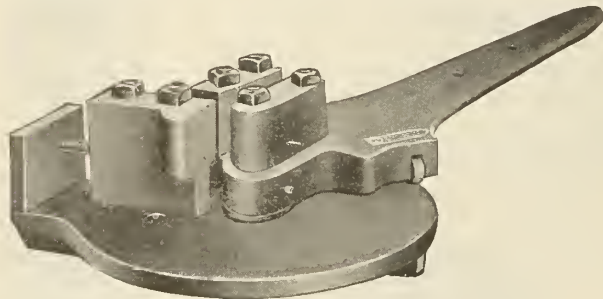
Why do you want a heavier machine to move about, or why do you want to pay out more money, when this will keep all the men busy that you can get around it?

Albany Hardware Specialty Manufacturing Co.

ALBANY, WIS.

Hand Power Bending Tools

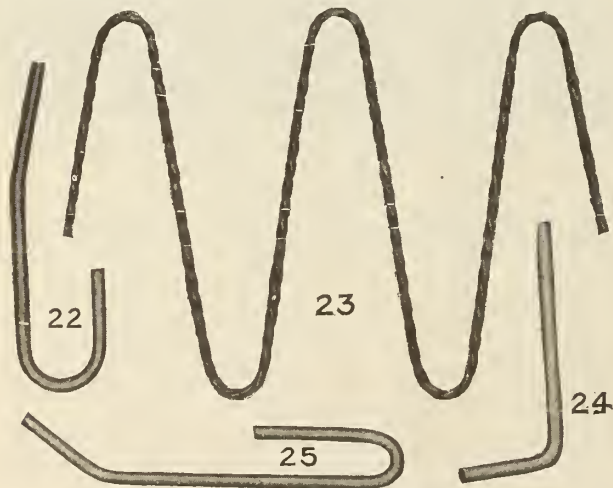
For some time, the Wallace Supply Co., 114 N. Jefferson St., Chicago, has specialized in hand power bending tools, which are of especial interest to the erector of reinforced concrete, owing to their



New "U" Bending Tool

ease of transportation. These benders are designed for forming angles in twisted, corrugated and other shapes of reinforcing rods, and will bend up to $1\frac{1}{4}$ " stock, cold. The type that handles material of this kind is operated by one man and when mounted on heavy stand has a net weight of 466 lbs.

A new bending tool for making "U" bends, has recently been added to the Wallace line. It has a



BENT COLD WITH NEW TOOL

No. 22— $\frac{3}{4}$ " Round, Mild Steel
No. 23— $\frac{3}{4}$ " Square, Round, Twisted H. C. Steel
No. 24— $\frac{3}{4}$ " Round, Mild Steel
No. 25— $\frac{3}{4}$ " Round, Mild Steel

special application to concrete work in the manufacture of stirrups, but is adapted to making all varieties of "U" bends in general manufacturing. The No. 2 size will make bends from 1" between the legs of "U" up to 8" from outside to outside. A separate forming die is required for each size. The apparatus weighs only 178 lbs., net.

CONCRETE wants a limited number of copies of the issue of CONCRETE of December, 1911. Readers of the magazine who have copies of this issue to spare please write. If when you write we still need copies of that issue we will notify you to send yours along. We are willing to give two month subscription extensions for each of a limited number of copies of the issue of December, 1911.

Books Reviewed

Concrete Costs. By Frederick W. Taylor and Sanford E. Thompson. Pages, 692. Illustrated. Size, $5\frac{1}{4} \times 8$. Price, cloth, \$5.00. John Wiley & Sons, New York.

This work, by the authors of *A Treatise on Concrete, Plain and Reinforced* has been looked forward to with a great deal of interest in many branches of the concrete industry since it was announced several months ago that the authors were preparing the material which it contains. In an introduction by Mr. Taylor, he says: "It is hoped that this book will be used: (1) By architects, engineers, and contractors in making accurate estimates of the cost of concrete works and structures. (2) By contractors, superintendents, and foremen to help them to so lay out and plan their work that their materials will be more economically handled and used than in the past, and that each workman will do more and better work than heretofore. (3) To assist in the introduction of the principles of scientific management in the building trades. The writer fully realizes that for several years to come this third use will be subordinate to the other two; and yet so thoroughly convinced is he of the ultimate triumph of the principles of scientific management that he hopes and firmly believes that the promotion of this cause will be in the end the most important function of the book."

The book is an outgrowth of the study made by Frederick W. Taylor of the *Principles of Scientific Management*, this subject having been treated in a book bearing that title, which appeared last year. The present work *Concrete Costs* applies the principles of scientific management to the concrete industry. It represents many years of work, in careful watching of labor of various kinds performed, in tabulating the time required to do various things in various ways, and in a study of the best arrangement of doing things to accomplish the desired result in the least time and with the least labor. It does not stop here, however, but it records data which comprise a text book for the architect, the engineer, and the contractor, by which they may hope to arrive at preliminary estimates of cost with considerable accuracy. Inasmuch as much pains has been taken in the preparation of the work so to separate the many small factors which enter into the cost of construction, (considering the various conditions under which the same work may be done at different times and in different places) that all these factors and conditions can be taken into consideration in arriving at the estimate, it will be used extensively as a means of estimating construction costs and planning construction work. The introduction further explains as follows: "The work of writing a book of this sort divides itself into three sections: (1) Analysis, i. e., analyzing all of the work in a given trade into its small elements; separating the efficient from the inefficient movements of the workmen; and then studying with a stop-watch the proper time for making each elementary movement. (2) Synthesis, i. e., making this time study practically useful by grouping together the proper series of movements for doing each class of work; summing up these "unit times" and adding the proper time allowance for unavoidable delays and accidents, etc.; and, finally, classifying and tabulating these data so as to place them in the simplest and most convenient form for practical use. (3) Proof, i. e., testing the value of the data and tables contained in the book by computing from the book the time it ought to take to build a structure about to be erected, and then comparing the 'book time and cost' with the 'actual time and cost' of the structure."

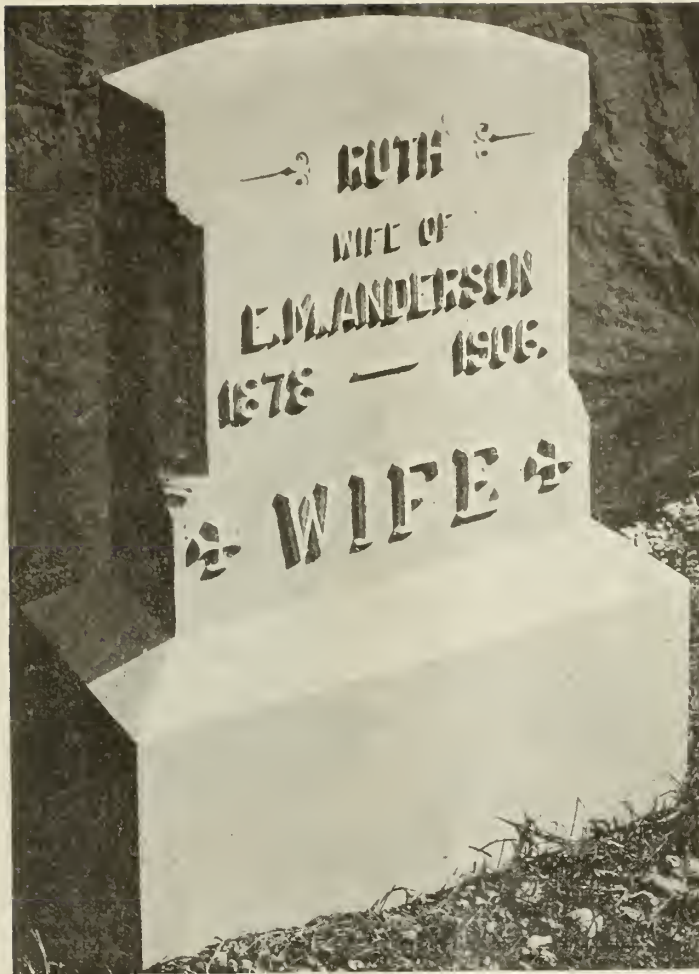
Only time and experience can give positive proof of the accuracy of the data presented in the book, and of their value in arriving at preliminary estimates of cost, but the fact that it is the work of the authors of another volume on concrete construction, which is already standard in the industry, it is pretty sure at least to be given a great deal of consideration, and it is reasonable to expect that it is going to be an unusually useful volume.

Cement Pipe and Tile. By E. S. Hanson. Pages, 151. Illustrated. Size, $5\frac{1}{4} \times 7\frac{3}{4}$. Price, cloth, \$1.00. Cement Era Publishing Co., Chicago.

This is the second edition, somewhat enlarged, of a book already quite well known in the industry.

Concrete Bridges, Culverts and Sewers. By A. A. Houghton. Pages, 42. Illustrated. Size, $5 \times 7\frac{1}{4}$. Price, paper, 50c. The Norman W. Henley Publishing Co., New York.

This is number 8 of a series of "Concrete Worker's Reference Books," treating in a practical way the special subjects named in the title.



The...

Universal Monumental Granitoid Device

Forms and Engraves at the same time

Does the work of twelve high class granite cutters and their helpers.

Invented and patented by L. Bowman, sole owner of territory rights, United States, Canada and Mexico.

We have the only concrete tombstone device on the market, giving exclusive rights to territory and device to the purchaser, that net the manufacturer 300 per cent minimum, and enable him to guarantee his product.

He can cut the prices of his competitors (the cut granite shops) one-half.

The longer a Universal concrete monument stands the harder it gets.

For further information address

J. R. WATTAM

Business Agent,

109 W. 11th St.

Fort Worth, Texas

Vaughan's Patent Concrete Spade

A Tool for Finishing Concrete Walls

**IT PAYS FOR ITSELF
IN A DAY'S WORK.**

By use of Vaughan's Patent Concrete Spade, you can force the coarse aggregates in the concrete back, while the forms are still about the wall, and let the finer cement mortar flow forward, the perforations in the spade allowing it to come to the front. Your wall is thus given a smooth finish, without applying face mortars.

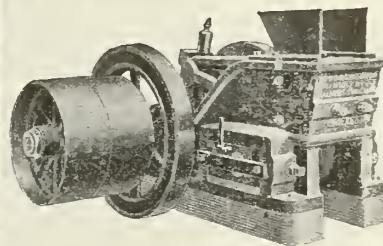
Manufactured only by

J. H. CLARK

Manufacturer of and
Dealer in

**CONTRACTORS TOOLS
AND SUPPLIES**

137-139 W. Lake St., Chicago



**THE ONLY
CRUSHER
FOR USE IN
Concrete Work**

Occupies small amount of space, small amount power required, costs little for repairs, produces a uniform product.

Ask for Catalogue A 12

CHALMERS & WILLIAMS, Inc.

General Office and Works, Chicago Heights, Ill.

One Merillat Culvert Core molds ALL sizes of Concrete Culverts

The Merillat Culvert Core is a collapsible, expandable metal core to form the barrel of the culvert. It may be adjusted to mold any culvert from 20" to 4' in diameter—the same form molds all sizes within these limits. Two men can easily handle the form. When concrete is set, turn the wheel and the form withdraws.

Ask for book of culvert information and the opinions of contractors and highway officials who use this core.

MERILLAT CULVERT CORE CO.

WINFIELD, IOWA

Construction of Concrete Porches. By A. A. Houghton. Pages, 50. Illustrated. Size, 5 x 7 1/4. Price, paper, 50c. The Norman W. Henley Publishing Co., New York.

This work is number 9 of a series of "Concrete Worker's Reference Books," treating in a practical manner various branches of the industry. The present work explains the construction of footings, the use of decorative panels, blocks, pillars and so on, and the construction of floors and steps of plain and ornamental design for porches.

Catalogs Received

Two well known mixers, the "Grand" and the "Hartwick," which are available for handling batches of concrete or mortar are illustrated and described in a well designed catalog issued by the Hall-Holmes Mfg. Co., Jackson, Mich. The book is profusely illustrated and contains detailed descriptions of the machines—what they are, what they do and how they do it. The Hall-Holmes Co. has been engaged in manufacturing mixers since 1905 and comparatively recently effected a consolidation with the Hartwick Machinery Co., Jackson, Mich. As a result of this consolidation, the line handled is fuller than ever before.

A folder showing how two lawn vases, two jardinières, a pedestal and a hitching post may be constructed with a single outfit is being distributed by A. A. Houghton, Northville, Mich. Mr. Houghton is well known as an enthusiastic concrete man and the author of several books on our material and its uses.

Catalog 284 is ready for present and prospective customers of the Diamond Expansion Bolt Co., 90 West St., N. Y. C. A number of new types of this ingenious device for securing fixtures to masonry have been developed by the company since its last catalog was issued and a feature of the present illustration is the fact that an illustration accompanies the description of each type shown.

"The Atlas Almanac," published for concrete men by the Atlas Portland Cement Co., 30 Broad St., N. Y. C., serves in its first issue to introduce a broader field of activity for the company. Announcement is made that future issues will be made a clearing house—without fees—of valuable information to dealers in and distributors of Atlas. They will be issued by the Service Bureau of the Company and will have to do with dealers' problems and how to solve them.

The Hayward Company, 50 Church St., N. Y. C., maker of buckets and digging machinery, has issued bucket catalog No. 39. This covers orange peel buckets, clam shell buckets, drag scraper buckets, scraper clam shell buckets, excavators, counterweight drums, derrick fixtures, traveling derricks, coal handling machinery and so on. These are only a few things made by the Hayward Co., but a complete list of its output would scarcely go into one catalog. Catalog 39, however, is very complete as regards the equipment named.

A bulky volume is catalog "D," issued by Harold L. Bond Co., 391 F Atlantic Ave., Boston, Mass. The house has branches everywhere and is very well known as a large manufacturer of tools and machinery for all forms of construction work, and as a big dealer in railroad, mill and contractors' supplies. Catalog "D" contains 318 pages of interesting matter. A carefully arranged index makes reference easy for the reader, who will certainly find material of value to him if he has anything to do with machinery of any kind.

The Peerless Portland Cement Co., Union City, Mich., has established a concrete products plant at Union City and concrete fence posts are being manufactured for use in fencing in the company's property. Members of the cement company have originated a separate corporation to run a general concrete products business. The plant is equipped with "D. & A." post molds, made by the D. & A. Post Mold Co., Three Rivers, Mich. Block and tile making equipment will be added later.

\$1,000,000

The great poultry industry of our present day is generally referred to as the Billion Dollar Industry. These figures are based upon the census as prepared by the United States Department of Agriculture at Washington, D. C. The production of poultry and eggs, therefore, must be reckoned as one of the foremost money-making pursuits. For twenty-two years

FARM POULTRY

the leading publication devoted to profitable poultry keeping, has been teaching everything worth knowing about the most successful ways and methods of Incubating, Brooding, Rearing, Feeding, Housing, Mating, Exhibiting, Killing, Dressing and Marketing of poultry for greatest profit. Professors of Poultry Husbandry at the leading Agricultural Colleges and Experiment Stations recommend FARM POULTRY as the sanest, safest and most reliable poultry paper published. Issued on the first of every month, and subscription price is but 50 cents per year. Price to Canada, 65 cents per year. Foreign countries, 75 cents. A sample copy is free.

FARM-POULTRY PUB. CO.,
Boston, Mass.

Commonwealth Hotel, (Inc.)

OPPOSITE STATE HOUSE

BOSTON, MASS.



Offers rooms with hot and cold water for \$1.00 and up, which includes free use of public shower baths.

Nothing to Equal This in New England.

Rooms with private bath for \$1.50 per day up; suites of two rooms and bath for \$4.00 per day and up.

Dining Room and Cafe first-class, European plan.

Absolutely Fireproof.
Stone floors, nothing wood but the doors.

Equipped with its own Sanitary Vacuum Cleaning Plant.

Strictly a Temperance Hotel.

SEND FOR BOOKLET

STORER F. CRAFTS,

General Manager



All-Steel Bar Cutters

100% Efficient

Powerful compact shears with guaranteed unbreakable frames of heavy rolled steel plate. Used by thousands of concrete contractors. Made in many sizes for bars of all shapes

Write for Catalogue No. 42, showing our complete line of hand and power punching and shearing machinery.

Henry Pels & Co., 88 West St., New York

Announcement

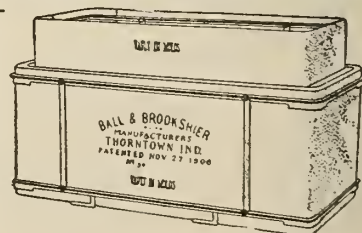
See Page 25

THE HOOSIER CEMENT BURIAL VAULT MOLDS

All steel, no wood Telescopes and adjusts for making twenty sizes of sinks, tanks, bath tubs or vaults. Makes vaults with circle corners, preventing cracks. Corners strongest portion of walls.

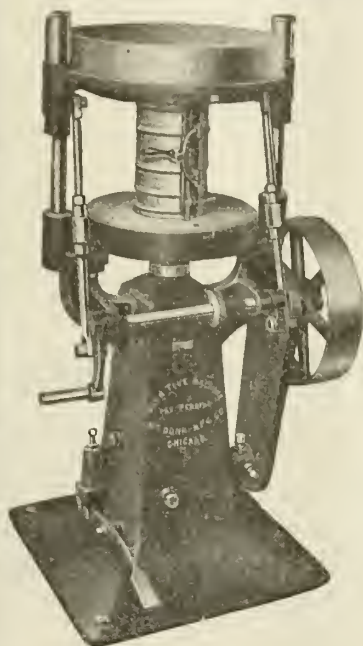
Ask for circulars Nos. 5 and 6 Agents wanted in every State.

BALL & BROOKSHIRE
Thorntown, Indiana



Two Excellent Money Makers

No other business today offers the possibilities for the money invested that the manufacture of cement drain tile and sewer pipe does.



Dunn Drain Tile Machine requires no large investment but has capacity of 2,000 tile per day. The only compact machine where all shafts and bearings are enclosed in a big cast iron dustproof base. This insures long life with continuous service.

Poured Sewer Pipe Molds require no tamping. Just make the mixture wet enough to pour. This method saves labor, saves cement and produces a better and more uniform article than the semi-dry tamped method.

SHIPPED ON 15 DAYS' FREE TRIAL

You operate them yourself in your own home town for two weeks before you accept them. That's a safe way to buy.

Send for 64 page catalogue. It tells all about this business—how you can make \$24.00 a day profit. Send a postal for one now.

W. E. Dunn Mfg. Co.

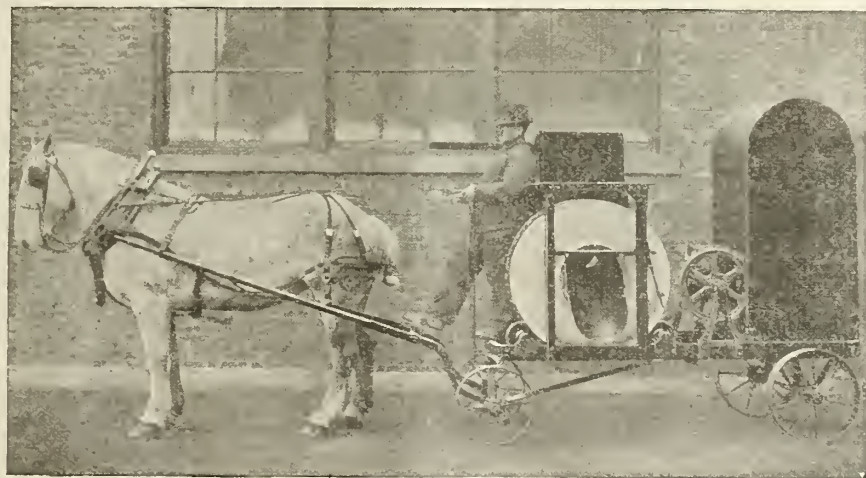
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CHICAGO, ILL.



Price \$175.00

Price \$7.50



NEW CHAIN BELT MIXER

For Sidewalk
Curb
Foundation
Silo and
other small
Construction

All the features that make the big Chain Belt Mixers the most efficient in actual use are combined in this new size, which is designed for use on small work where it is an advantage to be able to move the machine about with one horse.

Capacity, $3\frac{1}{2}$ cu. yds. of concrete per batch. Furnished with 3 H. P. gasoline engine or motor. Drum cast of semi-steel, in two pieces, a Chain Belt drive just like the larger Chain Belt Mixers.

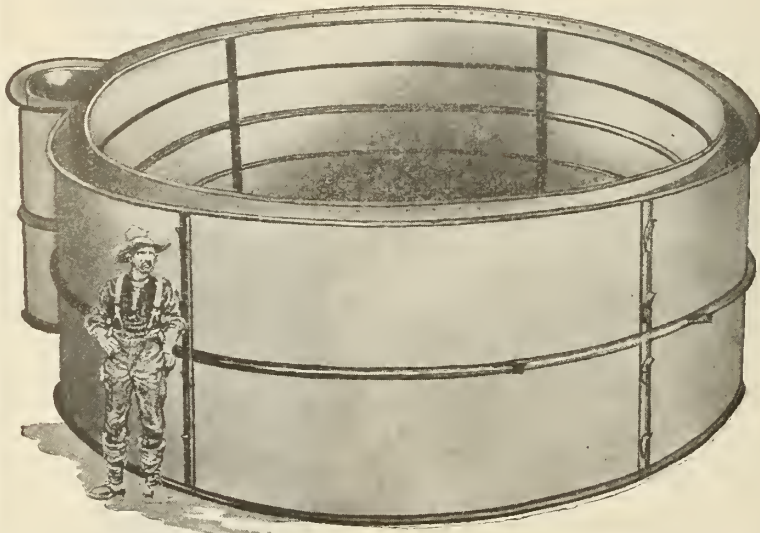
Write for special circular describing this size, which is known as "Chain Belt No. 00."

CHAIN BELT CO.

Milwaukee, Wis.

Chicago Office: 900 Old Colony Bldg.

MONSCO SILO MOULDS



Experienced silo builders buy Monsco Moulds because they are in a class by themselves as regards material, workmanship and simplicity.

Monsco Moulds are sold on a strictly commercial basis. If you are short of cash write for our

Easy Payment Plan

MONSCO moulds are built in quantities in a shop equipped with every facility in the way of special machinery, jigs and templates, for economical and accurate work, and only the

most skilled and best paid labor is employed. Material and workmanship absolutely guaranteed. Each mould made as accurately as a watch—a prime necessity for silo work.

MONSCO moulds are made in two circles each three feet high and each circle is divided into five segments, the chute mould making the sixth segment. Eighteen gauge galvanized sheet steel, specially rolled for this purpose, is used in making them. Re-enforcement, 1½ in. angles; and the weight will vary from 2100 pounds for a 12 ft. mould and upward, according to diameter.

Each MONSCO mould equipment includes 84 clamps for holding the segments together and 16 irons for concrete roof and cornice. A clamp is easily attached and detached and holds the segments and circles together as if in a vise.

Our copyrighted instructions cover every detail of building with MONSCO moulds, and they are so explicit, being illustrated with numerous drawings, that the operator cannot go wrong.

WRITE FOR OUR 50 PAGE BOOK ON SILOS AND SILAGE. IT COSTS YOU NOTHING

FOR SILO BUILDING

After thorough investigation of various types of derricks, we have adopted and recommend to our customers the **Taylor Portable Steel Derrick**. We have arranged to supply this derrick at factory prices and guarantee prompt shipment.

PRICE, F. O. B. CHICAGO, net	\$40.00
¼-inch Crucible Cable for Derrick, per foot	4½c
(Approx. breaking strain, 4,400 lbs.)	
¼-inch Swedish Iron Cable for Derrick, per foot	3½c
(Approx. breaking strain, 2,200 lbs.)	

DESCRIPTION

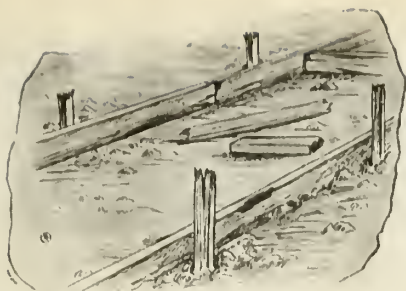
1. PORTABILITY. One man can climb a ladder with either section. Constructed entirely of malleable iron and steel.
2. Changeable capacity and speed to suit requirements.
3. Has roller-bearing circle swing for landing the load.
4. Weight of block unwinds cable on drum automatically.
5. Provided with a brake to control the drum.
6. Pawl and ratchet holds the load when operator releases the cranks.
7. Every machine tested before leaving factory to hoist and swing 1900 lbs.
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9. Bracket and bolts furnished with derrick for attaching base section.



Monolithic Silo & Construction Company

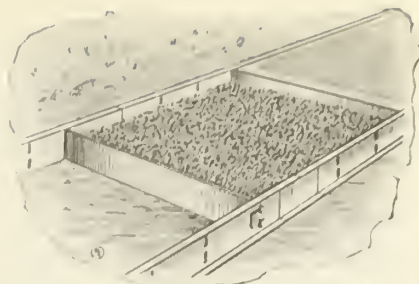
Builders of Monolithic Reinforced Silos

856 Peoples Gas Building, CHICAGO



The old way

The new way



←Which→
Are YOU Using?

The old type, objectionable wooden forms, with costly lumber, expensive to handle and bulky to haul—the kind that splits easily and makes an unsightly job—the kind that wastes time in cutting and driving stakes and more time in truing forms—the kind that requires the clearing away of debris at a further waste of time or are you using

BERGER'S PRESSED STEEL SIDEWALK FORMS

—the other kind?

These forms are compact, easily handled, make a clean quick job and saving in material and are strong and durable. The side rails give maximum strength with 20 per cent less weight than any other metal form.

No tools—no skilled labor; set up, trued and moved so quickly and easily that they save 2½c per square foot over the old style forms.

Our catalog will prove to you that **BERGER'S STEEL FORMS** will save you money—write for it today.

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For the best service address nearest branch.

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Boston
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Also Manufacturers of Raydiant Sidewalk Lights,
Ferro-Lithic and Multiplex Reinforcing Plates,
and Sheet Metal Building Material of All Kinds

San Francisco
St. Louis
Philadelphia



Trad. Mark
Rep. U. S. Pat. Off.

Let us send you a book that tells you all about

Bay State Brick and Cement Coating Protection

for Concrete, Cement or Stucco

This coating has been an unqualified success for twelve years and is an absolute protection against dampness and moisture and has been endorsed by the National Board of Fire Underwriters as a fire retarder.

Many of the largest textile mills, armories, breweries, as well as private houses, have used it as an exterior or interior coating with great success.

Be sure and write today for our booklet No. 12, which shows you the colors in which we make it.

Wadsworth, Howland & Co., Inc.,

Paint and Varnish Makers and Lead Corroders

82-84 Washington Street

Boston, Mass.

Crushed White Stone and Marbledust

USE IN YOUR WORK

Adds Little to Cost :: Increases the Profits

Livens up Cement Work, Improves Appearance of concrete blocks, bricks and all concrete products; adds to looks of Stucco and is unsurpassed for brilliant Floor Finishes; Unexcelled for white plastering and exterior plastering.

We are prepared to furnish Prompt Shipment and Perfectly Crushed Materials at a short notice.

Send for sample of our material and let us quote you prices.

CONLIN & CO.

Established 1903

TUCKAHOE, N. Y.

Liner Advertisements

Notes for these columns: Three cents per word per insertion, payable in advance. Copy can be accepted as late as the first of any month for that issue.

WANTED--Machinery

WANT TO BUY SECOND-HAND POW-er tile machine. Roy Terry, Box 325, Lincoln, Ill.

WANTED — A 24-INCH HAYDEN stripper. Chas. Gorenflo, 308 Runyon St., Newark, N. J.

WANTED — 6 SECOND-HAND TILE cars 24" gauge, with folding deck, or will trade Automatic Concrete Block Tamper for same. Address C. P., 214 S. 12th St., Philadelphia, Pa.

WANTED — HAND MOLDS FOR 15" and 16" tile; revolving or vibrating sand screen. Box 484, Paulding, O.

FOR SALE—Machinery

FOR SALE — ANCHOR BUILDING Block Machine; Adjustable Steel Culvert Core; cheap. Will trade for Concrete Mixer. Geo. K. Edwards, Granite City, Ill.

FOR SALE—PRACTICALLY NEW KRA-mer Tamper, at half price. Cement Products Co., Decatur, Ill.

FOR SALE—ONE ABSOLUTELY NEW Gauntt No. 3 Continuous Mixer, complete with steam engine, boiler and pump; capacity, ten yards per hour. This machine goes at cost to turn into money immediately. Offer subject to prior sale. The Osborne & Sexton Machy. Co., Columbus, O.

FOR SALE — SOMMERS CONCRETE Block Press. Good as new. Will sell for \$100.00 less than cost including pallets. Automatic Concrete Block Tamper for sale, \$85.00. Address Box 211, Bala, Pa.

FOR SALE—LOCAL RIGHTS TO MAKE best concrete waterproofing compound on the market. A. Chapple, P. O. Box 517, Tuscaloosa, Ala.

FOR SALE—U. S. JUNIOR CONTINU-ous Mixer and 6 Ideal face plates. Box 484, Paulding, O.

MR. CONCRETE-WORKER! DID YOU ever see on the surface of a cement walk where the maker had scratched his name with a trowel? Did it look workmanlike to you? Does it not detract from a fine piece of cement work, and make it look like an amateur's? A well finished piece of work should always be stamped with the maker's name, resulting in a good advertisement, but don't use a trowel! Let us make a Name Stamp for you and stamp your name right. It will reflect credit on you. Let us tell you about our Adjustable outfit. It stamps any name. Letters, figures and punctuations furnished with it. H. W. Knight & Son, Box C, Seneca Falls, N. Y.

FOR SALE CHEAP — 1 60-YARD Scheffler Double Mixing Trough, Continuous Concrete Mixer on trucks, 3 H. P. Engine; also 1 80-yard Systematic Continuous Mixer on trucks with 2 H. P. International Engine; both machines in A No. 1 condition. 1 20-in. Dunn Combination Block Machine; 1 set of 12-in. Porch Column Molds complete. S. M. Goodwyn, Taylor, Texas.

DEXTER

Portland Cement
THE NEW STANDARD

Sole Agents **SAMUEL H. FRENCH & CO.** Philadelphia



CONCRETE and CEMENT AGE

have consolidated and will be published as one paper

CONCRETE-CEMENT AGE

See Announcement on page 25

FOR SALE—Miscellaneous

MAKE A GOOD BLOCK MA-chine for about fifty cents. Illustrated directions, fifty cents. Have for sale the best brick and block machines cheap. William Barten, Gordon, Nebraska.

FOR SALE—WRITE WETT-laufer Bros., Buffalo, N. Y., for their Catalog with new plan of selling at bottom prices on Mixers and Brick Machines.

BLOCK MACHINES FOR building Double Wall Frost Proof Concrete Silos. Address, J. J. Coyne, Fond du Lac, Wis.

PATENTS SECURED — C. L. Parker, Patent Attorney, 954 G St., Washington, D. C. Inventors' handbook upon request.

*Send for our
Book
Catalog*

Concrete Pub. Co.
Detroit, Mich.

**THE COAST LINE
TO
MACKINAC**




**DETROIT
CLEVELAND
BUFFALO
NIAGARA FALLS**



**TOLEDO
PT. HURON
GODERICH
ALPENA ST. IGNACE**

THE CHARMS OF SUMMER SEAS

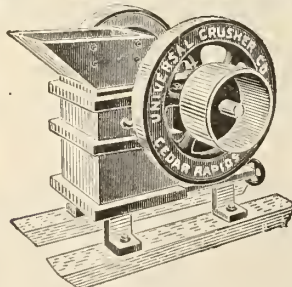
Spend your vacation on the Great Lakes the most economical and enjoyable outing in America.

Daily service is operated between Detroit and Cleveland, Detroit and Buffalo; four trips weekly between Toledo, Detroit, Mackinac Island and way ports; daily service between Toledo, Cleveland and Put-in-Bay.

A Cleveland to Mackinac special steamer will be operated two trips weekly from June 15th to September 10th, stopping only at Detroit every trip and Goderich, Ont., every other trip.—Special Day Trips Between Detroit and Cleveland, During July and August.—Railroad Tickets Available on Steamers.

Send 2 cent stamp for Illustrated Pamphlet and Great Lakes Map.

Address: L. C. Lewis, G. P. A., Detroit, Mich.
Philip H. McMillan, Pres. A. A. Schantz, Gen'l Mgr.
Detroit & Cleveland Navigation Company



Try this UNIVERSAL Crusher in your plant for 30 days

Our No. 2M has an opening $5\frac{1}{2}$ " x 12" when fitted for fine grinding, and 8" x 12" with the corrugated jaws for coarse crushing. It weighs 3000 lbs., takes 6 H. P. and will give from 20 to 50 tons in 10 hours, depending on how fine you want it.

This is certainly the machine for your Block or Tile plant, for your Gravel Pit, for handling the rejections in your Quarry, or for any place where uniform fine material is needed. Every machine is sold on a 30 days' trial to your heart's content—fair enough for any man. Send for our catalog.

UNIVERSAL CRUSHER COMPANY 33 B. Avenue
CEDAR RAPIDS, IOWA

In writing Advertisers please mention CONCRETE.

Mr. Reader:--It will pay you to watch this page from month to month

SEVENTH EDITION.

CONCRETE SIDEWALKS

With Chapters on
*Curbs, Gutters, Floors
and Pavements*

A Book of Practical Information
for the
General Concrete Contractor.
Price 35 Cents.

CONCRETE PUBLISHING
COMPANY
Detroit, Michigan.

330

SIZES AND STYLES

of Column, Baluster, Lattice, Pedestal, Cap and Chimney Blocks with one adjustable Mold. Does the work of over 300 single size molds. Five styles of face plates. Our circular No. A-28 fully describes this profit-making machine. WRITE FOR IT TODAY.

A. A. HOUGHTON,
Northville, Mich.

SPRUNK Engraving Co.

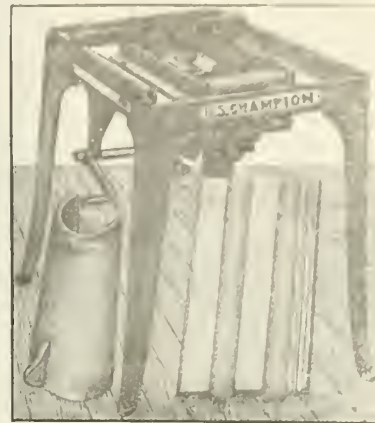


Crushed Granite

Screened to size, for concrete or artificial stone. The strongest and most durable aggregate. Two colors, gray or white. Woodbury Gray Granite is mouse-gray in shade. Hardwick White Granite is the whitest granite known. In carlots, at a low price.

Let us quote you also on granite sills or trim for use with concrete work. Quick delivery.

WOODBURY GRANITE CO.,
Hardwick, Vermont.



This Cement Roofing Tile Machine (Pat'd 3-12-07)

Is the only practical machine of its kind on the market. For durability and attractiveness the U. S. Champion tile roof supercedes all others. It has no competition. Little investment. Big profit. Write for our new catalog. L. Hansen & Co., 2036 Penn St., Kansas City, Mo.

Sanitoid Flooring

A Composition Mineral Substance laid in monolithic form and producing a fireproof, waterproof, permanent, and sanitary flooring base, or wainscot. Methods of installing SANITOID are simple and easily learned. Can be sold at good profits for a hundred different uses. Write for material costs and territory rights today.

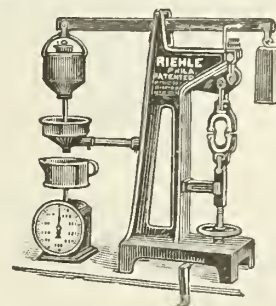
The Sanitoid Products Co.

701 Brunson Bldg. COLUMBUS, O.

Barten Process and Machine

For Making Concrete Building Blocks or a Slushy, Muddy Mix, also of a Moist mix. 1000 machines in one, and by far the lowest in price. Send for catalogue.

W. H. Barten, Gordon, Nebr.



RIEHLE
AUTOMATIC
CEMENT
TESTING
MACHINE

Pat. Nov. 8, 1904.

Solid Back Grip

Pat. Sept. 11, 1900
Pat. June 10, 1904

Testing Outfit

1424 North 9th St., Philadelphia, Pa.

Mixers and Brick Machines

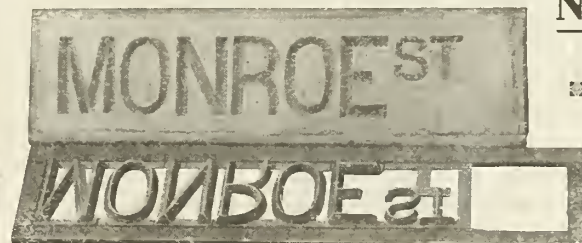
Write us for our catalog and new plan of selling mixers and brick machines at rock bottom prices.

Wettlaufer Bros.
Buffalo, N. Y.

Name Stamps

For lettering sidewalks, steps, horse blocks, posts, corner stones, tomb stones and dating concrete blocks, and other concrete products, cast in molds. Adjustable, clean-cut, cheap.

Write for prices.
Adjustable Name Stamp Co.
CLINTON, WIS.



Advertisers

To manufacturers of small specialties not profitably advertised in big space and manufacturers of heavy equipment who want to "feel out" this field we recommend the use of advertising space on this page. Advertising space here is given distinctive position, and will bring results. This rate is low because no large space is sold; you can keep your proposition before our readers the year 'round at little expense. No advertisement accepted to occupy more than 3 inches single column, on this page. Ask for rates.



“The Standard” Low Charging Mixer With “Cart Charger”

Designed for rapid work and to do away with wheelbarrows. Carts, each having capacity of one batch for the mixer, are filled at the piles, with the proper proportions of stone or gravel, sand and cement. By using the hoist the carts are brought onto the mixer platform, where the complete batch is dumped into the mixer as soon as the previous batch is discharged.

The man operating the engine on gasoline outfits also operates the hoist and the automatic water tank, consequently one workman less is required at the mixer.

Also from one to three less workmen will be necessary for bringing the materials to the mixer, and a greater amount of work will be accomplished with the few men required.

The saving of labor cost alone will pay for the complete outfit in a very short time.

After rains and in wet weather when the runways are slippery, or during extreme hot weather, the “cart charger” will bring the materials to the mixer “just as easy” and rapidly without over-exertion of the men.

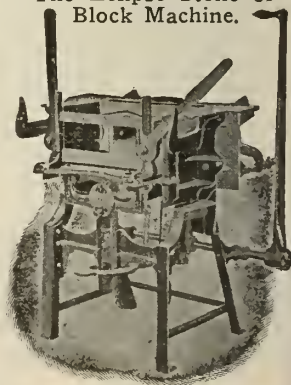
Also when the materials are wet they can be

handled in this “cart charger” and readily dumped into the mixer, when it would be impracticable with side-loading hoppers or other methods. Contractors who have used side-loaders know that wet materials will not slide from the charging hopper into the drum.

As the mouth of the cart is as wide as any other portion, the material falls easily and a complete batch is charged from the carts into the large opening of the mixer drum in a few seconds.

On street or other work where the mixer is moved forward as the work progresses, the cable which is used to draw the carts to the mixer can be attached to some stationary object ahead, such as a telegraph pole, and the mixer pulled forward by its own power.

The Eclipse Stone or Block Machine.



Our new catalogue No. 36, ready June 1st, illustrates this “Cart Charger” as well as other money saving designs for the Contractor—your name brings it. Write to-day.

The Standard Scale and Supply Company

NEW YORK
136 West Broadway

PHILADELPHIA
35 South Fourth St.

PITTSBURGH
243-245 Water St.

CHICAGO
1345-1347 Wabash Ave.

Simmons Sectional Concrete Pile Casings

Are Carrying the Dead Loads of Buildings and the Live Roads of Railroads

Over 2,000 Linear Feet are Supporting New York Structures



For underpinning and where head room is limited, this construction of a pile is unequaled.

We have instances where a pile has been driven over sixty feet without losing its alignment or buckling.

They can be hammered, jacked or jetted in place. Piles of any ultimate length can be built up during the progress of driving.

The sections can be made from 4 to 20 feet long to suit the conditions. Our stocks can be drawn from to supply any desired length of piles.

Send for circulars and prices.

We are equipped for all kinds of Special Machine Shop Work—in Piping, Columns, Railings, Roof Structures, Cold Storage, Flag Poles, Fittings, Valves, Tools and Specialties for Contractors, Engineers, Water Works and Industrial Plants.

John Simmons Co.

101 Centre Street

New York

Milburn Acetylene Lights

SEND FOR NEW 48 PAGED CATALOGUE



50 to 24,000 Candle Power

For Concrete and all Kinds of Construction Work

THE ALEXANDER E. MILBURN CO.

505-507 W. Lombard St.

BALTIMORE, MD.

Ottawa Silica Company

Ottawa, Illinois

Largest Miners and Shippers of White Sand in the United States

Washed and Steam-Dried

White Sand

Unexcelled for

Facing Concrete Blocks, Ornamental Concrete Stone, White Plaster, Exterior Plastering, Roofing, Sawing Stone, Marble, etc.

You can order less than a carload, in fact shipments as small as five 175 lb. bags can be delivered economically

Analysis 99.90 Pur Silica

Prices, Freight Rates and Samples on Application



Poured Concrete Construction

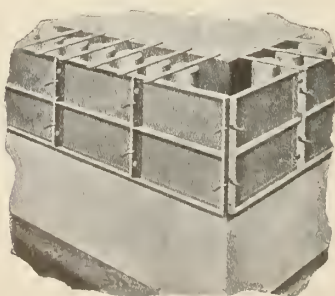
Concrete construction is rapidly narrowing down to **POURED** construction. Experience has shown architects and owners that buildings with **POURED** concrete walls, floors and roofs are best and cheapest.

Reichert Metal Molds were the first successful forms placed on the market for this kind of work. They have been improved upon. They are used all over the United States by careful builders who work under particular architects. Concrete houses in Europe are built with these forms. Reichert Moulds are quickly and easily erected, retain perfect alignment, withdraw easily and cut the cost of form work more than one-half.

The United States Steel Corporation used these forms in building scores of houses at Gary, Ind. One of the terraces is shown above. In every town of 3,000 inhabitants or over there is money to be made by the contractor who will use Reichert Moulds on his work. He can build better buildings and more of them. He saves money on every job where form work is required. His satisfied customers add to his business every year.

Something About Forms

Made of rustproof metal, reinforced with steel angles, Reichert Moulds are light and strong. They do perfect work because they are built mechanically right. Patent clamps hold sections rigidly in place as the wall mould is built up, piece by piece. All these points are fully covered by patents.



How to Learn More About This Kind of Construction

If you want to do better concrete work, at a lower cost and consequently greater profit, ask for our booklet on poured concrete construction and metal mould work. No work is too small, no job too large, for Reichert Moulds.

REICHERT

Manufacturing Company

Milwaukee : Wisconsin

In writing Advertisers please mention CONCRETE.

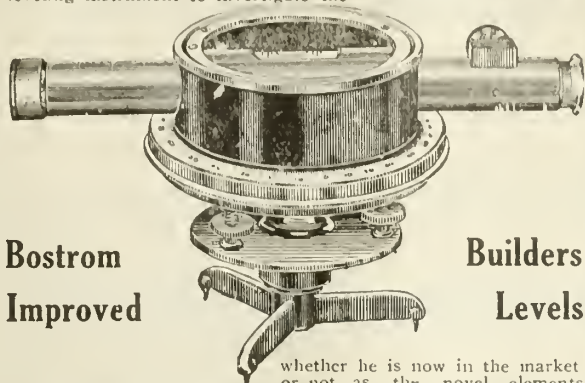
Money in Silo Work With Reichert Silo Moulds

In a few years, every silo built in this country will be of concrete. The same points that have made Reichert Straight Wall Moulds famous are found in our Flexible Silo Moulds. One set of molds with additional plates makes silo of any diameter. Reichert Moulds require less labor than others — with these molds you can meet competition. Let us send you a special folder describing our Silo Moulds. Write for this folder today before you forget it.



UNANIMOUS ENDORSEMENT

of purchasers in every State and practically every County in the Union makes it the duty of every man who has need for a leveling instrument to investigate the



**Bostrom
Improved**

**Builders
Levels**

whether he is now in the market or not, as the novel elements of construction entering into the Bostrom Level afford means for proving the accuracy of the work which we GUARANTEE is not surpassed in even the most expensive engineering instruments, and that feature when combined with their simplicity affords ease and quickness of adjustment and operation which marks the greatest improvement made in leveling instruments during the last quarter of a century.

That Bostrom's Levels fill a long felt want among all classes requiring the use of a dependable instrument, is best indicated by the demand already created throughout the continent which has resulted in our manufacturing in such quantities as to save the purchaser about one-third the cost of the old familiar type architect level, as the price of our No. 3 is only \$25.00, and No. 4 only \$30.00; either outfit including tripod, graduated rod, target, plumb-bob, etc.—the only difference being in the magnifying power of the Telescopes, No. 3 being 10 diameters, and No. 4 being 18 diameters. Prices named are F. O. B. New York, Atlanta, St. Louis, and all Pacific Coast cities. Shipping weight, 15 lbs.

If not sold in your town, will ship direct on receipt of price; or will ship C. O. D. SUBJECT TO APPROVAL—money back, including all express charges paid, if dissatisfied, or disappointed in any respect after thorough trial.

Order direct from this announcement or write for illustrated description. Our reliability guaranteed by this publication.

Bostrom-Brady Mfg. Co., 138 Madison Ave., Atlanta, Ga.

Men who have tried every cement and concrete waterproofing made say there is nothing else as good as

Driwal

IT meets every need for waterproofing or for waterproofing and decoration combined. Equally good for new or old work. Not affected by acids or alkalis. Does not change the texture of the surface and can be used on Cement or Concrete, Brick, Stone or Stucco.

**White, Black, Transparent and
14 Permanent Flat Colors.**

Send for Illustrated Booklet which gives Methods and Costs of Concrete Waterproofing and Decoration. (Color Card enclosed.)

Bilchaco Cement Floor Coating prevents dusting—saves wear—prevents oil stains. Six colors.

The Billings-Chapin Co.

Boston

Cleveland

New York

ADVERTISERS' NOTICE

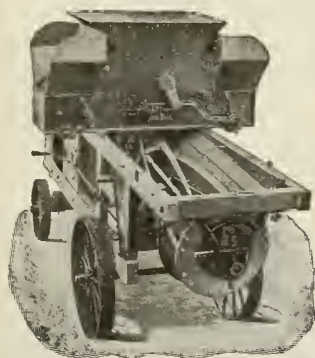
Changes in copy and discontinuance orders for July number of CONCRETE must reach this office not later than June 18.

New advertising can be accepted as late as July 1.

CONCRETE PUBLISHING CO.

Detroit, Mich.

"THE SAVING IN COLORING THIS SAWDUST WAS ABOUT \$60.00 A CAR"



No. 52 Coltrin with Proportioning Feed

Cement Machinery Sup. Co.,
Denver, Colo.

Denver, Colo., April 30, 1912.

Dear Sirs:—During the past two years that I have been operating a Coltrin Mixer, I have mixed and placed approximately 6,000 cubic yards of concrete for all kinds of work, such as sidewalks, foundations, basements, reinforced piers, floors, etc. I have also color-mixed several carloads of sawdust (with a green fluid) which was used on the floor of the Stock Yard's Stadium during the annual Stock Shows. This is probably the first time a concrete mixer has been used for such a purpose. The saving, over hand work, in coloring this sawdust, was about \$60.00 a car.

The total expense for repairs, during the time I have owned the mixer, will not exceed \$10.00, and it is in good running condition today. I have received \$6.00 per day as rent for my machine on several occasions. My Coltrin has more than paid for itself and I am perfectly satisfied.

Very truly yours,

FRED LIND.

The Coltrin Continuous-Batch Mixers

Shipped anywhere on five days' trial.

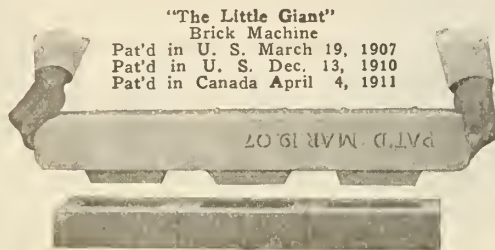
THE KNICKERBOCKER CO.

Jackson, Michigan

WRITE FOR 1912 CATALOG.

THE LITTLE GIANT BRICK MACHINE

OVER 4,000 LITTLE GIANTS IN USE



"The Little Giant"
Brick Machine
Pat'd in U. S. March 19, 1907
Pat'd in U. S. Dec. 13, 1910
Pat'd in Canada April 4, 1911

Special Price to mail order buyers.

WHY? BECAUSE—by the use of our removable cures you make nearly 6,000 BRICK out of same amount of material you would make 5,000 solid, and yet make a brick that will make a better wall. Ask your Masons. This saving will nearly pay labor cost.

YOU SAVE—cost of lumber for pallets by removing brick from the machine on the level ground, or any level surface.

BUT, IF—pallets are used, **NO BROKEN BRICK**. REASON, you remove brick **LENGTHWISE** of PALLET (see illustration) instead of crosswise. ASK those **WHY** who have had experience in removing brick out crosswise of pallet.

ANY SHAPE—brick can be made. THE "LITTLE GIANT" will make you money at every turn.

BIG THINGS—to look at if you are in the market for a brick machine. You ARE done experimenting when you buy a "LITTLE GIANT."

LA GRANGE SPECIALTY COMPANY, :: :: LA GRANGE, INDIANA



Stained with Cabot's White Waterproof Cement Stain.
Harry B. Shoop, Arch't, Harrisburg, Pa.

CABOT'S Waterproof Cement Stains

*Soft, Artistic and Durable Colors
Completely and Permanently Waterproof*

These stains cure both of the great defects of cement as a building material, i. e., its porous character and its cold, cheerless monotony of color. They thoroughly waterproof the surface and color it in soft, rich tones without covering or spoiling the texture. They are not "painty" and cannot crack or chalk or peel. They are cheap, easy to apply and beautiful.

Send for catalogue and full information.

SAMUEL CABOT, Inc., MFG. CHEMISTS
BOSTON, MASS.

1133 Broadway, New York.

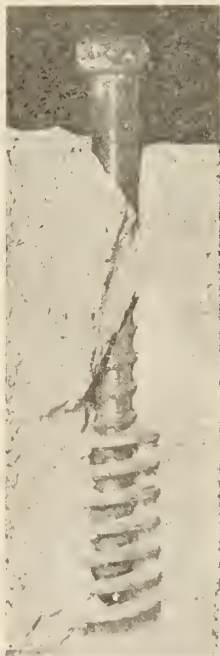
Agents all over the Country.

350 Dearborn Ave., Chicago.

Cabot's Creosote Stains, Waterproof Brick Stains, "Quilt," Conservo Wood Preservative.

YOU CANNOT LOOSEN A RICHMOND SCREW ANCHOR

(Patented)



YOU CAN'T TEAR IT OUT, WORK IT OUT, JAR IT OUT, OR PRY IT OUT. ONCE IN, IT IS THERE TO STAY.

The only way to dislodge a bolt put up with the Richmond Screw anchor, is to unscrew it. But you can screw it in and out as **OFTEN** as you please.

And for wear you have a metal-to-metal bearing. An expansion shield alone costs more than the Richmond bolt and anchor.

Thirty million in use.

Write for circular and sample.

Richmond Screw Anchor Co.
7 Church Street New York City

The cost of an Automatic Bucket is not what you pay for it, but what it costs you in maintenance.

Hayward Buckets

are the best buy because they show the greatest economy of repairs—almost none in most cases—last longest and can be operated at a lower cost, to say nothing of handling a maximum output.

If your Plant or Yard is not at the water front, you can still save big money in unloading all classes of materials from barges by means of the Hayward "A" Frame Dock Machine, such as is shown in this picture. This type of machine dumps the rehandled materials into the hopper, from which it is either drawn by horse and wagon direct to the consumer or to the yard, storage pile or job nearby. Only two men are required, an operator and fireman—and the rate of unloading is from 80 to 100 tons an hour, depending on the capacity of the Hayward Bucket used.

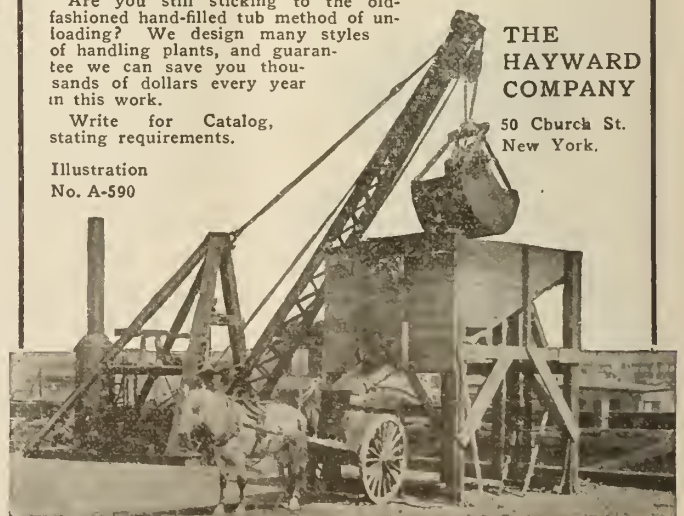
Are you still sticking to the old-fashioned hand-filled tub method of unloading? We design many styles of handling plants, and guarantee we can save you thousands of dollars every year in this work.

Write for Catalog, stating requirements.

Illustration
No. A-590

**THE
HAYWARD
COMPANY**

50 Church St.
New York.

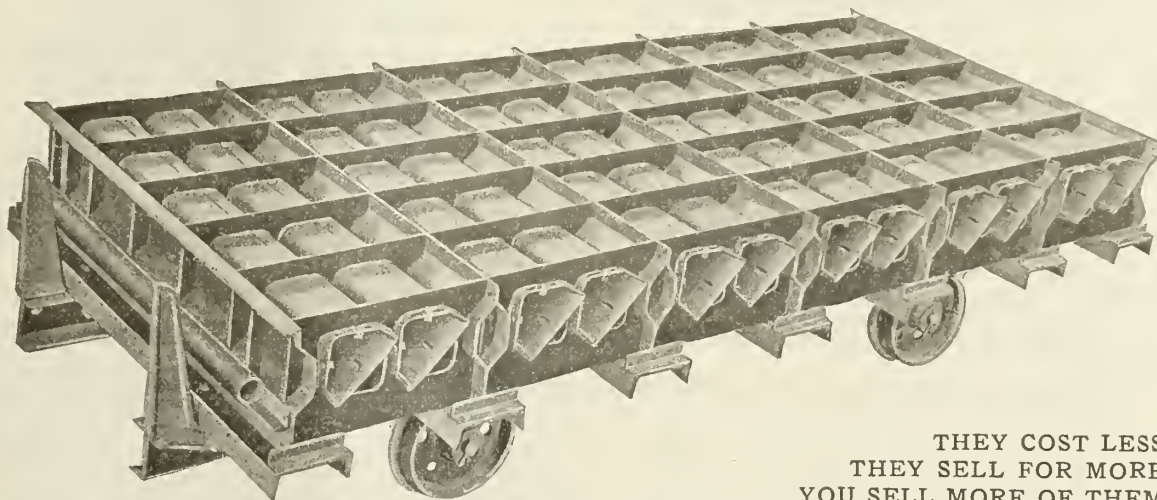


Zagelmeyer System

of Casting

Hollow Cement Building Blocks

The Zagelmeyer System uses a SLUSH CONCRETE for body of block and a patented process of applying the facing, which gives the block the most NATURAL STONE EFFECT of any block made. Blocks made by this system are GUARANTEED ABSOLUTELY WATER-PROOF, have THREE TIMES THE CRUSHING STRENGTH and are the handsomest blocks in the world. They sell for 25% more than the best dry tamp block and can be MADE CHEAPER than any other block on any other system.



THEY COST LESS
THEY SELL FOR MORE
YOU SELL MORE OF THEM

THE MOULDS IN THE ZAGELMEYER SYSTEM

are so PERFECTLY CONSTRUCTED that the faces of block are guaranteed not to vary the ONE-HUNDREDTH PART OF AN INCH in SIZE. THE CORES pass through from one side of the car to the other; they are NON-TAPERING AND COLLAPSIBLE, and withdraw with perfect ease after cement has set. It is THOROUGHLY PROTECTED by PATENTS which enable us to give EXCLUSIVE TERRITORY. Secure your own city BEFORE SOMEONE ELSE DOES and get into a BUSINESS THAT PAYS. This is positively the best Cement proposition in the United States today.

MR. BLOCK MAKER.

Are you satisfied with your present system of block making? Are your customers satisfied with the blocks you sell them? Our system will satisfy both yourself and your customers. You will be satisfied because you can make the blocks for less money, can sell them for more and can sell more of them. Every customer is your friend and is boosting your business. Your customer will be satisfied because he will be getting a block so far superior to anything he ever saw that he simply can't kick and it makes him feel so good that he tells all his friends. A satisfied customer is the best advertisement you can get and our system certainly produces satisfied customers. Secure our system for your territory before your competitor does.

MR. CEMENT WORKER.

There is no branch of the concrete industry so profitable as making CAST CONCRETE BUILDING BLOCKS by our system. Their superior quality commands the respect of architects and builders, and the LOW COST TO MANUFACTURE enables you to compete with all kinds of building material. There is practically no limit to the demand for such a cement block as our system produces, as architects readily specify them for all classes of buildings.

If you act quick enough you can secure the exclusive right to manufacture them in your locality, and you will then have a monopoly of the most profitable part of the concrete industry.

A postal brings our Catalog and Proof of our Assertions.

Zagelmeyer Cast Stone Block Machinery Co.

22 CRUMP AVENUE, BAY CITY, MICH.

THE KOEHRING.

3 In 1 Principle of Mixing Means Three Times as Much Mixing

Three times as much mixing in a given time or an equal amount of mixing in one-third of the time.

It is all due to the fact that there are three independent and opposed continuous mixing actions in the Koehring drum, any one of which produces as much mixing as the entire mixing action of most other mixers.

There is a cutting through at the bottom and lifting and pouring of material from the side and end-to-end mixing, breaking the material over against the heavy cast drum heads and a cataract flow off the inner ends of the discharge chute, producing a thoroughness of mixing, a rapidity of mixing and a uniformity of mixing no other machine equals.

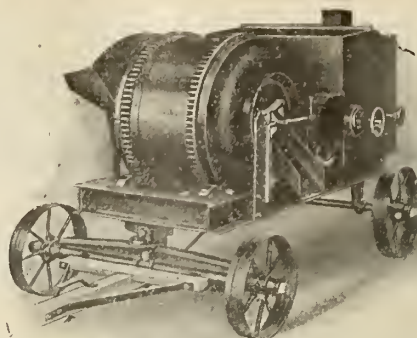
There are almost equally important advantages in the mechanical construction of the Koehring Mixer.

The heavy cast special metal Koehring drum will outlast the drum of any other mixer.

The trunion rollers are keyed onto the axles and rotate as a unit precisely in the same manner as a railroad truck, making impossible "wabbly" drums and rollers.

The charging bucket raises to nearly vertical position, enabling all material to pass into drum without pounding the bucket.

Why not write for our catalogue?

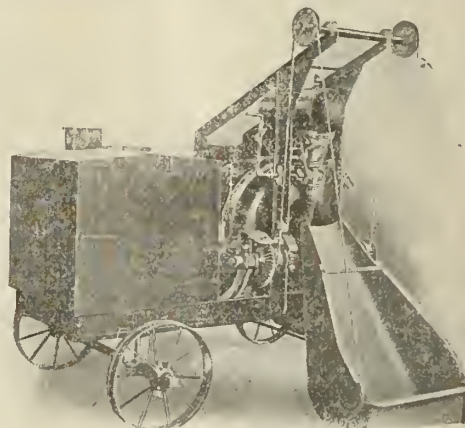


KOEHRING MACHINE CO., Milwaukee, Wis.

Equipped with Standard Hopper Showing House over Gasoline Engine.

KOEHRING MIXER AGENCIES

Baltimore, Md.—Thomas M. Brown, 32 Knickerbocker Bldg.
 Birmingham, Ala.—J. F. Donahoe Co., 8th Floor Woodward Bldg.
 Boston, Mass.—F. O. Johnson, 70 Kilby Street.
 Butte, Mont.—Montana Lime & Flux Co., 501 W. Galena.
 Charleston, S. C.—Carolina Portland Cement Co.
 Chicago, Ill.—Koehring Machine Co., 857 Peoples Gas Bldg.
 Columbus, Ohio—Williams Contractors, Supply Co., 8th Floor Brunson Bldg.
 Dallas, Texas—Wm. T. Fulton Co., 2035 Commerce St.
 Denver, Colo.—H. S. Hitchman Co., 411 Nassau Bldg.
 Detroit, Mich.—Good Roads Supply Co., 1408 Ford Bldg.
 El Paso, Texas—Wm. Jennings Co., 411 Roberts-Banner Bldg.
 Grand Rapids, Mich.—A. B. Zierlyn & Co., 324 Houseman Bldg.
 Greensboro, N. C.—E. F. Craven, 327 S. Dalre St.
 Kansas City, Mo.—Koehring Machine Co., 808 Victor Bldg.
 Los Angeles, Cal.—California Machinery & Equipment Co., 630 Higgins Bldg.
 Louisville, Ky.—Chandler-Burgy Co., 42 Fodd Bldg.
 Memphis, Tenn.—P. H. Linz, 44 Byrd Bldg.
 Minneapolis, Minn.—D. F. Bowler Equipment Co., 208 Palace Bldg.
 Newark, N. J.—Abbey-Brooks Co., 514 Essex Bldg.
 New Orleans, La.—Wm. E. Joor, 802 Perrin Bldg.
 Philadelphia, Pa.—Lee T. Ward Co., 688 Bourse Bldg.
 Pittsburgh, Pa.—Carlin Machinery Co., Sandusky and Lacock Sts.
 Rochester, N. Y.—H. B. Trevor Co., 144 Cutler Bldg.
 Salt Lake City, Utah.—Harris Bros., 310 Atlas Bldg.
 San Francisco, Cal.—Hicks, Nell & Marks, 604 Mission St.
 San Antonio, Texas—Alamo Iron Works.
 Seattle, Wash.—Moran Engineering Co., 1246 First Ave., So.
 St. Louis, Mo.—C. E. Robideaux, 1510 Chemical Bldg.
 Toronto, Ont.—Canada Foundry Co., Ltd.



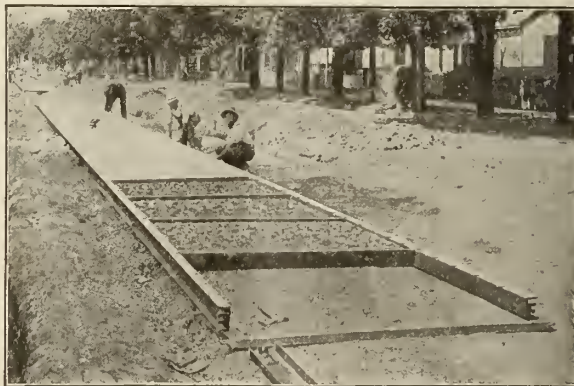
Charging Side View Equipped with Side Loader, Water Tank and Gasoline Engine.

The Blaw System practically eliminates the cost of form work in the construction of

CONCRETE HOUSES

Simplest, best and cheapest. Cannot build crooked walls. Blaw Forms require less than half the labor in handling that other forms require.

Complete steel form systems furnished for the largest as well as the smallest concrete buildings for every purpose.



Agents wanted in all parts of the country to sell Blaw Sidewalk Curb and Curb and Gutter Forms.

Blaw forms are designed from the contractors standpoint. They are light, rigid, quickly and easily handled, and will last a lifetime. The design is simple and the cost low. Our engineering department is at your service—tell us what your problem is.

Sewer Centers Pipe Molds Aqueduct Centers Tunnel Forms Subway Forms
 Shaft Forms Wall Forms Large Span Arch Ribs Culvert Molds
 Silo Forms House Forms

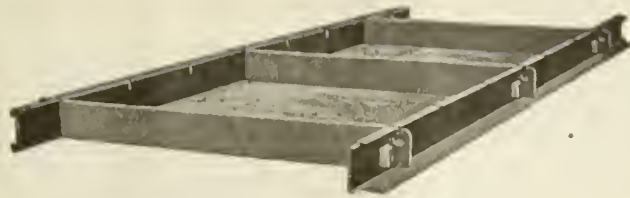
Architects—We are conducting a prize competition for the best designs for concrete residences. Write for particulars.

Blaw Steel Centering Company

New York—165 Broadway.

General Offices, Westinghouse Bldg., Pittsburgh, Pa.

Chicago—917 Ashland Block.



Zeiser Sidewalk Forms

The First Sidewalk Forms to be Placed on the Market---They've Been First Ever Since

You will find that it's money in your pocket to throw away your stakes and braces and expansion joint cutting tools—go at the sidewalk business right by using modern methods that mean economy.

Zeiser Forms enable you to do the best work for the least money. They are quickly set up, easily taken down, can be used over and over again, and will be as good as new at the end of the season. Insure a perfect expansion joint at every cross joint, and reduce labor cost 50 per cent.



Zeiser Tie and Dividing Plates are for use with wood side-rails. Their cost is but a trifle compared with what they will save you. Zeiser All Steel Sidewalk Forms consist of steel side-rails, steel dividing plates, quarter circle curves, flexible side pieces, and extension side-rails. They constitute the most modern and up-to-date sidewalk equipment in existence.

Our new self-locking device requires no wedges, bolts, keys, or hooks. You can have forms equipped with either this new lock or with a wedge lock or with both.

We know we have the best—Let us show you.
Write for Prices and Information.
Don't Delay—Do it Today.

Zeiser Brothers
1318 E. 8th St., Berwick, Pa.

Unusual Conditions Where GANDY Has Proven So Successful

Read this convincing
letter from one user:

"Gentlemen
We have two GANDY Main Driving Belts working under peculiar conditions. We require the belts to slip when overloaded. The GANDY Belts meet our requirements, and are as good as ever. Leather belts working under like conditions would soon be destroyed by the heat generated in slipping. Yours very truly,
THE SCRANTON BETTON CO.
(Signed) P. L. Sylvester, Supt."

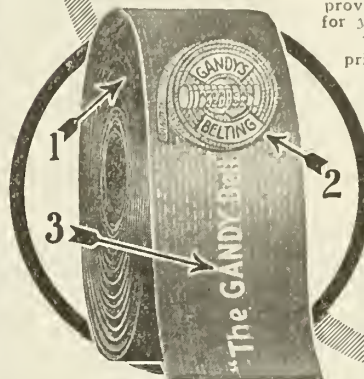
The many letters we receive along this line show how serviceable the Gandy is under extraordinary conditions, and convince us it will prove itself to be the most durable and economical belting for your work.

Remember—The Gandy Belt

is made by the largest manufacturers of stitched cotton duck belting in the world, backed by more than thirty years of success.

We want you to give the GANDY a trial—let us prove just what it will do you for you.

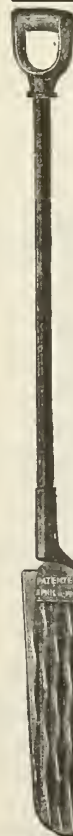
Write today for samples, prices and full information.



How you can always recognize Gandy Belting. Look for these three identifying marks:
1st—The Green Edge.
2nd—The Trade Mark.
3rd—The Brand—The Gandy Belt.

The Gandy Belting Co.
753 W. Pratt St.
Baltimore, Maryland
New York Office—88-90 Reade St

The ROSS Concrete Spade



DOES THE WORK MORE
EASILY, MORE RAPIDLY
AND BETTER AT A REDUCED
LABOR COST.

What more could you ask for in a concrete spade for use while the concrete is wet in the forms! What you want is better work, done more rapidly, better finished and at less cost. That's what you secure with the Ross Concrete Spade. And that's why you should write to us today for free booklet that tells why the Ross works so perfectly and cheaply. Large contractors are now using the Ross, not only in America but also in foreign countries. It is the most popular concrete spade ever invented.

Suppose you write us at once.

HAROLD L. BOND COMPANY

383 F Atlantic Ave., Boston, Mass.

Sole Export Agents.
The (U. K.) Winget Concrete Machine
Co., Ltd.
9 Star Buildings,
Newcastle-on-Tyne, England.

Harold L. Bond Company,

383 F Atlantic Ave., Boston, Mass.

Please send me full details about the Ross Concrete Spade.

Name

Address

Waterproofing Concrete at Less than Half Price

By a newly discovered process the strength of TRUS-CON WATERPROOFING PASTE has been wonderfully increased so that only a little more than one-third of the former amount is now required per cubic yard.

TRUS-CON WATERPROOFING PASTE *CONCENTRATED* is the result of a remarkable concentration of the colloidal-forming ingredients, reducing the necessary quantity of paste so that only

Five Pounds of TRUS-CON WATERPROOFING PASTE "CONCENTRATED" Will Waterproof a Cubic Yard of Concrete.



Mixed in the water used for the concrete and penetrates with it to all parts of the mass. Simple to use, doing away with all expensive and special mixing. Saves time and money. Positive in results. Does not weaken the concrete work in any way. TRUS-CON WATERPROOFING PASTE "CONCENTRATED" marks a new era in waterproofing of concrete. Absolutely the best and most economical.

Tell us about your waterproofing problems and we will furnish valuable suggestions, estimates and catalogue.

Hand Book on Waterproofing and Finishing FREE!

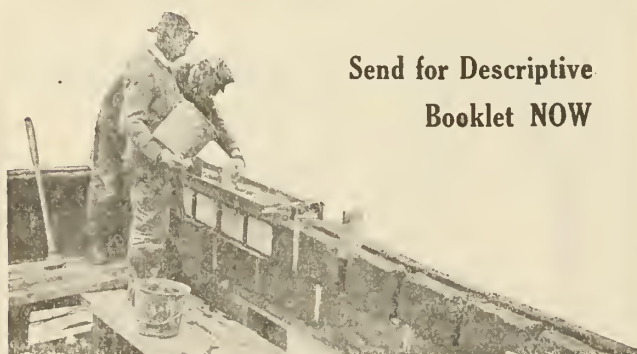
Contains the latest scientific and practical information on waterproofings, dampproofings and technical finishes for all structures of concrete, brick, masonry, plaster or steel. TRUS-CON COMPLETE HAND BOOK sent FREE, if you write us about your particular work.

TRUSSED CONCRETE STEEL CO.

450 Trussed Concrete Building

Detroit, Mich.

WATERPROOFINGS—DAMP PROOFINGS—TECHNICAL PAINTS



Send for Descriptive
Booklet NOW

Making ready to insert the floor beams.

Van Guilder Hollow Wall Concrete Machine--- Continuous Air Chamber from Celler to Roof

Steel Reinforced Throughout

Don't Waste Your Money

The labor employed for making building material such as blocks, brick, tile, etc., we utilize to erect the building.

Completely revolutionizing building methods.

OUR WALLS ARE STRONGER

being double and monolithic from footing to roof plate with a continuous air space everywhere between,—a house within a house. The walls are tied together, also steel reinforced horizontally every 9" high.

Our Buildings Are Warmer in Winter, Cooler in Summer.

Damp proof	Vermin proof	Cost less
Frost proof	No maintenance	Sell higher
Fire proof	Everlasting	

Exterior Finish, Up-to-Date Italian Stucco.

OUR SILO MACHINES

build the best silo walls in the world. No freezing of ensilage. No vermin. No repairs. Continuous air space. Stand forever.

Send for Illustrated Folders.

Van Guilder Hollow Wall Company

728 Chamber of Commerce Bldg.

Rochester, N. Y.



COMMON SENSE

Tells You This Wall is Waterproof

Water can't pass through metal ties. It can pass through any concrete connection between the outer and inner wall of a house.

Blocks made on our block machine make a wall like the one shown. These blocks sell easily. They please architects and owners.

The machine is easily operated. One man can make and rack 150 blocks per day. Get out of the old rut and buy a machine that will put you beyond the reach of competition. Write for our catalog. It'll show you how to get out of the woods—how to make money in this concrete business.

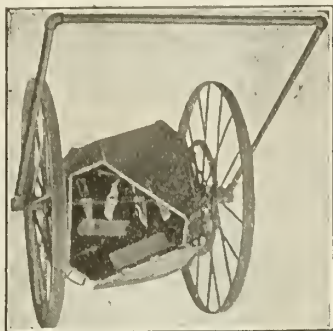
Cherry Valley Iron Wks.

Monroe, Wash.

Agents Wanted

All over the country, to handle this machine. No agent need apply who handles any other block machine.

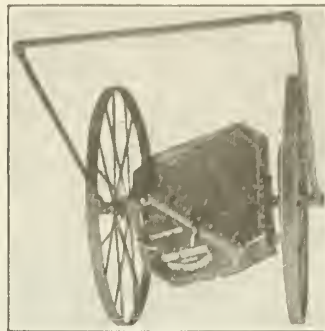
Arnold Concrete Mixer



A hand Traction Mixer Completely Operated by Two Men

NO CRANK TO TURN.

Concrete Mixed While the Materials Are Being Wheeled from the Stock Piles to the Forms.



THE ONLY REALLY PORTABLE MIXER ON THE MARKET.

It does away with the use of wheelbarrows, mixing boards and mortar boxes. Mixes, conveys and deposits, all in one operation. **ONLY ONE HANDLING OF THE MATERIALS.**

If You have No Mixer Here is Your Chance to Get One, at a Low Cost, that will Enable You to Compete with Anyone

If You Have a Power Mixer You Need the Arnold Mixers to Use on Your Flat Work and Small Jobs.

Capacity, per man, 5 cubic yards, mixed and placed, per 8-hour day.

Write today for full particulars to,

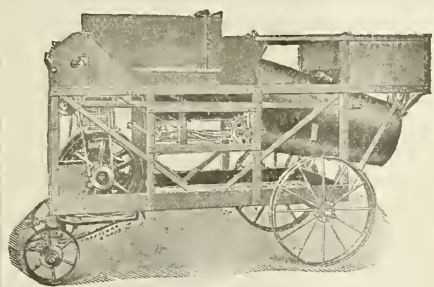
(Agents wanted in unoccupied territory.)

F. T. ARNOLD

224 Williams Street.

NEW LONDON, CONN.

C. F. Blount, Southern Sales Agent, 522 Grant Bldg., Atlanta, Ga.



Little Giant Concrete Mixers will fill every want in Concrete Mixing.

Made in three styles:

Model A—Hand Power

Model B2—2 Hopper Power with $2\frac{1}{2}$ H. P. Engine.

Model B3—3 Hopper Power with $3\frac{1}{2}$ H. P. Engine.

Make perfect concrete.

Have ample capacity.

Easily handled and give the best of results.

We guarantee every machine to work satisfactorily, proportion accurately, with the minimum cost for upkeep.

Our Air-Cooled Engines are a marvel for steadiness and reliability.

Ask for Catalogue and further information.

Ballou Mfg. Co.

104 High Street

BELDING, MICH.

Saves 20% on cost of Mixing Concrete

E. W. Sproul, general contractor, 172 Washington St., Chicago, has used a lot of mixers and laid a lot of concrete. He has tried all the big ones. He says he saves 20% by using a

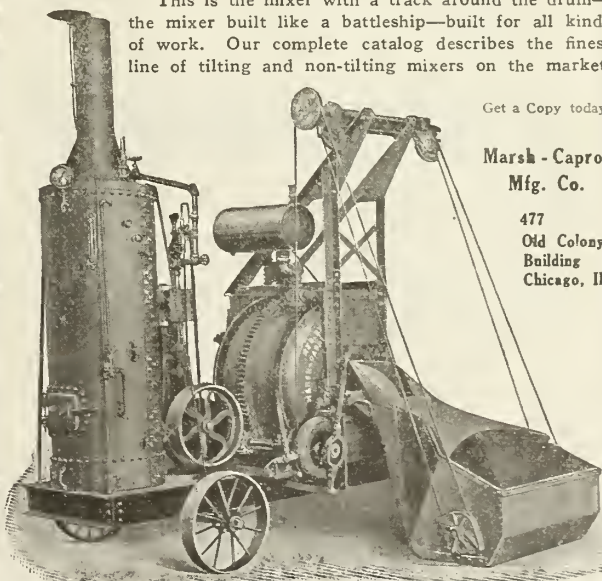
M-C Rail Track Mixer

This is the mixer with a track around the drum—the mixer built like a battleship—built for all kinds of work. Our complete catalog describes the finest line of tilting and non-tilting mixers on the market.

Get a Copy today.

Marsh - Capron Mfg. Co.

477
Old Colony
Building
Chicago, Ill.



WAINWRIGHT GALVANIZED STEEL CORNER BAR

FOR PROTECTING EDGES OF CONCRETE CURBS, STEPS, COLUMNS, ETC.

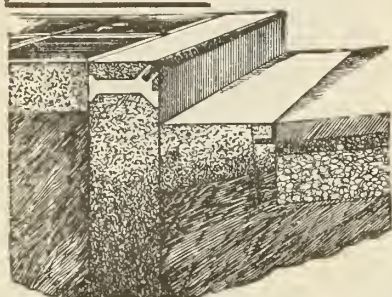
"Wainwright
Patents."

March 9, 1897
Nov. 22, 1898
May 5, 1903
March 26, 1907
August 29, 1907
August 2, 1910

THE BAR WITH A FOURTEEN YEAR RECORD

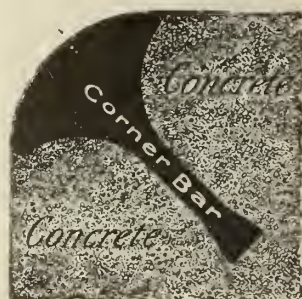
THIS BAR IS SELF-ANCHORING, THE DOVETAILED WEB HOLDING IT FIRM IN PLACE EVERY INCH OF ITS LENGTH, PRESENTING A RESISTING DEPTH OF TWO INCHES OF SOLID STEEL, AT EVERY POSSIBLE POINT OF IMPACT.

This bar has been in public use for more than fourteen years as the main feature of the



WAINWRIGHT STEEL-BOUND CONCRETE CURB

ABSOLUTELY NON-BREAKABLE
CHEAPER THAN GRANITE



GALVANIZED STEEL CORNER BAR prevents Chipping or Breaking on Edges.

MECHANICALLY PERFECT AND UNEQUALLED FOR CURVED CORNERS.

OVER FOUR MILLION FEET IN USE IN MORE THAN FOUR HUNDRED CITIES IN THE UNITED STATES

THIS CURB WILL STAND HARDER USE AND LAST TEN TIMES AS LONG AS PLAIN CONCRETE CURBING

CONTRACTORS can make money by laying this curb. CITY ENGINEERS can save money by specifying it.

ARCHITECTS are invited to read pages 238 and 239 "Sweet's Index."

METAL PARTS FOR SALE. SEND FOR COPYRIGHTED BOOKLET NO. 2.

STEEL PROTECTED CONCRETE CO., Real Estate Trust Bldg. PHILADELPHIA, PA.

How to treat concrete floors successfully—

Every architect, builder and engineer who has installed concrete floors has encountered difficulty in making them satisfactory. The concrete surface is likely to dust and may absorb unsightly stains. These minor objections to concrete floors are instantly and permanently overcome by applying

"CRECONTO" Concrete Coating

This material gives the concrete floor a smooth, hard, non-absorbent finish that prevents dusting and is a bar against oils, grease or other materials penetrating the concrete and leaving stains. Particularly important in factories, hospitals, jails, garages, etc. Applied quickly, dries in 12 hours.

Ask for color card and prices.

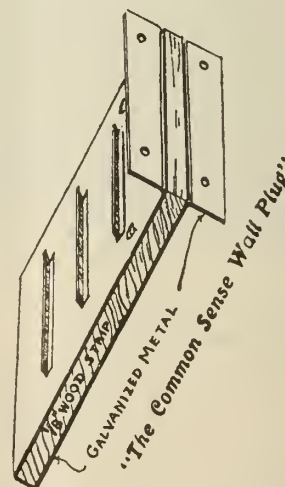
Fireproof Building Materials Co.

507 Reliance Bldg.

Kansas City, Mo.

Southwestern Contractors and Architects: Get our circulars and prices on metal lath, wall plugs, wall ties, stair treads, concrete carts, mixers, reinforcing steel, corner beads and general building supplies.

"The Common Sense Wall Plug" STANDING ON ITS MERIT



MERIT

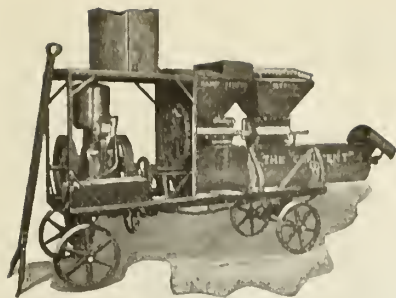
ARE YOU A USER OR A LOSER?

SAMPLES FREE

The M. O. Wicks Mfg. Co.

48 Nassau Ave.

Glen Cove, N. Y.



Showing Mixer With Stone Hopper

How Your Neighbor Makes Money

YOU profit by the experience of others, or, in other words, we profit by the experience of *each other*. For instance—if John Jones is putting money in the bank by making cement tile and brick, don't you stand the same chance? And if Sam Brown is cleaning up a bunch of money by using an up-to-the-minute mixer, what's keeping you from doing the same thing? Take an inventory of yourself, and then let us tell you how John Jones and Sam Brown are doing it with

"Crescent" Continuous Concrete Mixers—The simplest, strongest, most practical and handy mixers on the market. Proportions wet and dry materials accurately, and mixes thoroughly. The price is low. Every cement worker should have one. We guarantee it.

"Crescent" Sewer Pipe and Tile Molds—Used the world over, and by Uncle Sam in his reclamation work. All sizes 4" to 48". Bell-up or bell-down on same mold, with or without pallets. We employ over 500 patterns in making pipe and tile molds alone. We can explain every "in and out" of this business.

"Crescent" Vertical Tamping Brick Machines—The only practical and scientifically correct machine on the market. Our 1912 model has a big feature that revolutionizes brick machines—the combined hopper, stripper and finisher, combined and patent facing plate. You will want it if you see it.

"Crescent" Power Tile Machines—To make tile 3" to 10". The price is very low. This machine alone is a big profit producer. Can be operated by one man. Utmost strength. Exclusive features.



"Crescent" Sewer Pipe Mold

SEND THIS NOW

Raber & Lang Mfg. Co.

802 Mill St.

Kendallville, Ind.

Fill Out and Send to Us

Raber & Lang Mfg. Co.,
Kendallville, Ind.,

Please send prices and free literature on the following:

☐ Mixers ☐ Tile Molds ☐ Brick Machine ☐ Power Tile Machine

Name

Address

How to make more and better concrete building blocks.

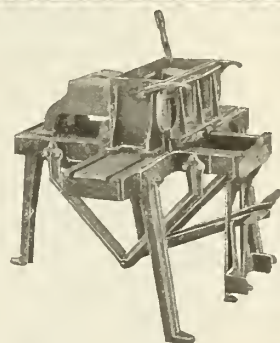
Buy a WORLD BEATER

The same reasons that make the World Beater the best machine for a man to buy who is already in the concrete business, make it the best buy for the beginner.

The World Beater makes any size, style or design of block up to 24" long, 12" thick. It turns out a faultless product and increases your capacity 25%—it has the rare combination of quality and speed. The attachments for making veneer, circular, solid, cored, regular and irregular blocks give a World Beater owner several machines in one.

Sold on ten days' trial. We know it will make good. Write for particulars, stating kind and size of blocks you wish to make.

U. S. Gas Machine Company Muskegon, Mich.
Both Phones 636.



THE WORLD BEATER
The machine that will positively save you 25% in time and labor.

HESS MEDICINE SANITARY LOCKER



The Recessed Steel Medicine Cabinet

The Only Modern, Sanitary STEEL Medicine Cabinet

or locker, finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimmings. Steel or glass shelves.

Costs Less Than Wood

Never warps, shrinks, nor swells. Dust and vermin proof, easily cleaned.

Should Be in Every Bath Room

For styles—four sizes. To recess in wall or to hang outside. Send for illustrated circular.

HESS, 902L Tacoma Bldg. CHICAGO

Makers of Steel Furnaces.

Free Booklet.

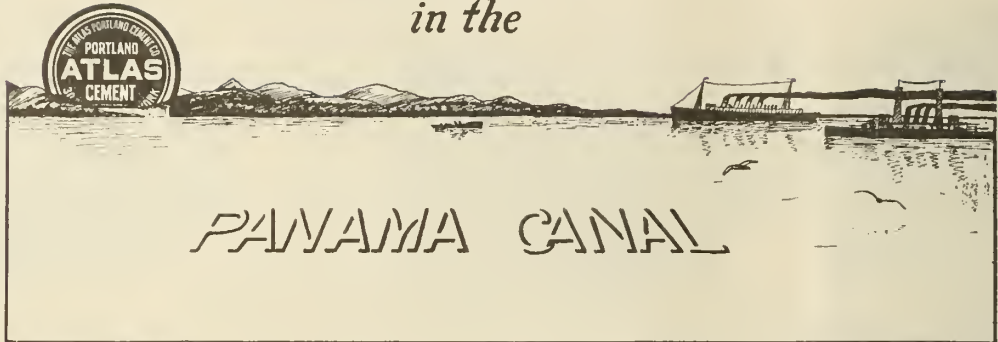


The Outside Steel Cabinet

Men pooh, pooh, sometimes, at "Book Learning." A man's own experience certainly is the best teacher. But a man's own experience doesn't contain enough to be all-sufficient. He must know what experience other men have had. The knowledge of other men's experiences is to be found in books. Practically every book of value to the concrete worker is listed in a catalog which will be sent to you by the **CONCRETE PUBLISHING COMPANY**, 97 Fort Street West, Detroit, Michigan, merely for the asking.

ATLAS

in the



PANAMA CANAL



000 MILES OF ATLAS

If the five million barrels of Atlas Portland Cement used in building the Panama Canal were placed end to end, they would reach from New York to San Francisco, and would require over 33,000 freight cars to move them.

It is a significant fact that on the largest concrete job in the world, Atlas Portland Cement—made in the largest cement mills in the world—was used exclusively. There's a reason why you should use it—

"The standard by which all other makes are measured"

THE ATLAS PORTLAND CEMENT CO.

30 BROAD ST., NEW YORK

Morris Bldg. Philadelphia, Pa. Corn Exch. Bank Bldg. Chicago, Ill.

The standard by which all other makes are measured

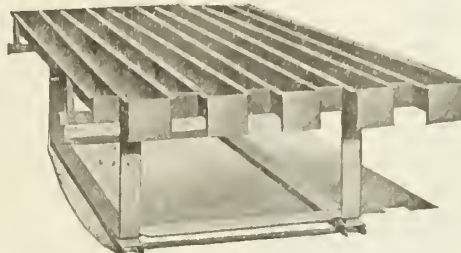
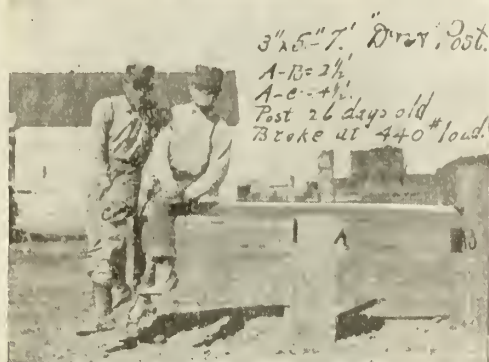


Productive capacity over 50,000 barrels per day.



STRENGTH, DURABILITY and LOW COST are the Features of "D & A" CEMENT FENCE POSTS

The "D & A" MAKES TEN POSTS AT ONE TIME



"D & A" POSTS will stand all the strain required of them, can be made with common labor; as six and ten are made at one time, the labor cost is much less than by any other system. "D & A" POSTS are much lighter than many of the so-called light weight posts, also much stronger; the only correct principles for making fence posts are incorporated in the "D & A" MOLDS and the "SHAKING SYSTEM."

CONCRETE PRODUCTS PLANTS in all parts of the U. S. and over a dozen foreign countries are now using "D & A" equipment with success and satisfaction. There is a large demand for "D & A" Cement Fence Posts and we are daily referring customers to owners of "D & A" machines and molds. Specially adaptable to steam curing.

Our catalogue, "Concrete Posts and How to Make Them," is fully illustrated and gives the construction and operation of "D & A" MOLDS and MACHINES, and use of concrete posts in detail, giving names and users and Railway installations, with outlines for ordering equipment. We endeavor to keep a reasonable sized stock on hand for immediate shipment at all times, and solicit your inquiries. Send for catalogues and circulars now. Prices and discounts quoted upon request.

D. & A. POST MOLD CO. Offices and Factory **THREE RIVERS, MICH.**
212 Third Avenue

"D & A" TEN-mold outfit supporting ten individual molds up from the ground for convenience and speed of molding, no back breaking making posts down upon the ground or floor.

All-steel, no castings or weak parts to break, no parts to wear out. Not one of the hundreds of "D & A" Machines or Molds has ever required a cent's worth of repairs.

Cost of Manufacturing "D & A" Concrete Posts.

Material and Labor	Average Cost	Will Make	Average per Post
1 yard gravel	\$0.20 — .80	40 posts	\$0.00½ — .02
1 bbl. cement	.80 — 1.20	24 posts	.04 — .05
3 or 4 strip reinforcement,		for each	
2 to 2½ lbs.....	.02½ — .03	post	.05 — .08
2 men 1 hr., 15c to 25c..	.30 — .50	15-20 posts	.02 — .03

Total cost per post.....\$0.11½—\$0.18

The above estimate is based upon a 1 to 4 mixture, and would be reduced considerably in a 1:2:4 mixture, as some are using.

WHEN YOU NEED



Tile Machinery
Concrete Mixers
Block Machines
Brick Machines
Post Machines
Tile Molds
Wheel Barrows

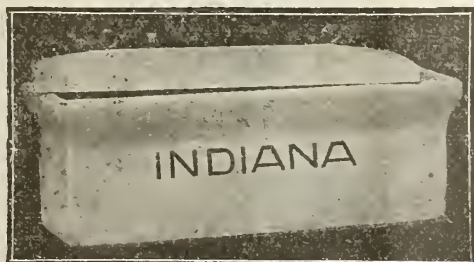
Sand Screens
Sand Elevators
Stone Crushers
Steam Shovels
Gasoline Engines
Dump Wagons
Ornamental Molds

Industrial Cars
Steam Boilers
Friction Hoists
Sand Washers
Cement Tools
Side Walk Forms
Culvert Forms

Write us for literature and prices for we are sure that the S. & S. Line will please you. We make a specialty of equipping concrete product plants complete and can furnish you with anything from a short handled shovel to the complete plant.

The Cement Tile Machinery Company

985-90 Rath Street WATERLOO, IOWA



We sell
**Burial
Vault
Molds**

NO TERRITORIAL RIGHTS OR ROYALTY.
Satisfied Customers' Testimony.

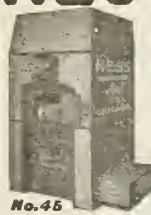
"We have been using your Mold for months, and are entirely satisfied."

"We are getting good results with your Mold, and are much pleased." Write us for circulars.

INDIANA CONCRETE BURIAL VAULT CO.
780 Lemcke Bldg., Indianapolis, Ind.

HESS FURNACE

Sent on
Approval



No. 45
"Leader" Hess
Steel Furnace
Price \$49.00

Delivered East of Omaha and
North of Ohio River
Pipes and Registers Extra

We will deliver a complete heating equipment at your station at factory prices and wait for our pay while you test it during 60 days of winter weather.

The entire outfit must satisfy you or you pay nothing. Isn't this worth looking into? Could we offer such liberal terms if we didn't know that the Hess Furnace excels in service, simplicity, efficiency, economy.

We are makers—not dealers—and will save you all middlemen's profits. No room for more details here. Write today for free 48-page booklet which tells all about it. Your name and address on a post card is sufficient.

HESS, 902 Tacoma Bldg., Chicago

Makers of Hess Sanitary Steel Lockers or Medicine Cabinets for Bath Rooms. Illustrated circular free.

Ornamental Concrete

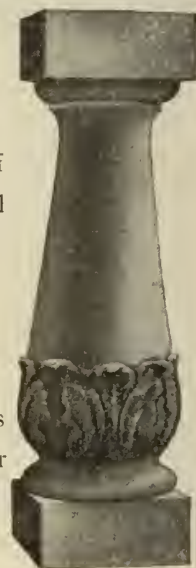
Your equipment is not complete without an assortment of moulds for making ornamental concrete products for columns, balusters, vases, etc. An attractive porch is as important as the door and windows. Make your selection from our complete attractive line.

Lawn Vase Moulds

Height over all 33½ in. Outside diameter of bowl 16 inches. Furnished with plain or ornamental base. Bowl only or complete mould supplied.

Round Baluster

Ten different sizes and designs of spindle moulds from 14-30 inch high. Round or square. Plain or decorated.



Northwestern Concrete Machinery

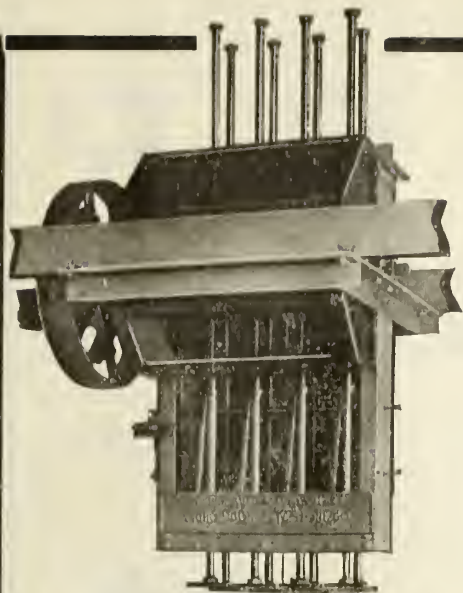
Special Catalogs published on

Ornamental Moulds
Block Machines
Batch and Continuous Mixers
Culvert Forms
Finishing Tools
Complete lines of everything.
Any catalog sent on request.



**Northwestern
Steel & Iron Works**
1093 Spring Street
Eau Claire Wis.

Ball and Base Mould
Eleven different sizes.



**ANCHOR
Concrete
Stone
Co.**

Rock Rapids,
Iowa.



ANCHOR AUTOMATIC TAMPER

Runs silently—Strikes 600 blows per minute.

Instead of having one or two men bending their backs over your block machine, getting tired as the day grows older, getting out a few blocks of varying density, why not have an Anchor Automatic Tamper, requiring no floor space, suspended over your machine, with eight tampers, each striking 75 blows per minute, 600 lbs. each?

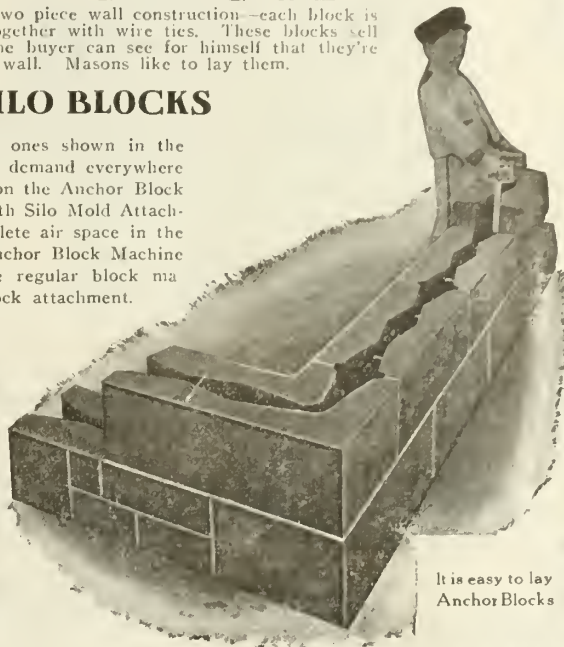
With this tamper you increase your output, improve its quality and cut down the cost per block. The tamper is noiseless—runs like a watch. Fits any block machine. Get our Special Tamper Circular.

ANCHOR BLOCK MACHINE

Makes blocks for two piece wall construction—each block is in two pieces, tied together with wire ties. These blocks sell themselves, because the buyer can see for himself that they're bound to make a dry wall. Masons like to lay them.

ANCHOR SILO BLOCKS

Silo blocks like the ones shown in the silo wall below are in demand everywhere—they may be made on the Anchor Block Machine equipment with Silo Mold Attachment. Note the complete air space in the silo wall. Write for Anchor Block Machine catalog describing the regular block machine and the silo block attachment.



It is easy to lay
Anchor Blocks

A World Wide Patronage Anti-Stick Products

Not an Experiment

We reach all classes of Concrete Work

Anti-Stick, a liquid coating for concrete forms of all kinds, used with the poured process. No sticking of concrete. No oils or grease. Preserves both wood and steel forms. Releases concrete from natural stone.

Anti-Stick Enamel, a coating for forms of all kinds used with the damp process and where the forms are removed immediately. No pulling of face plates.

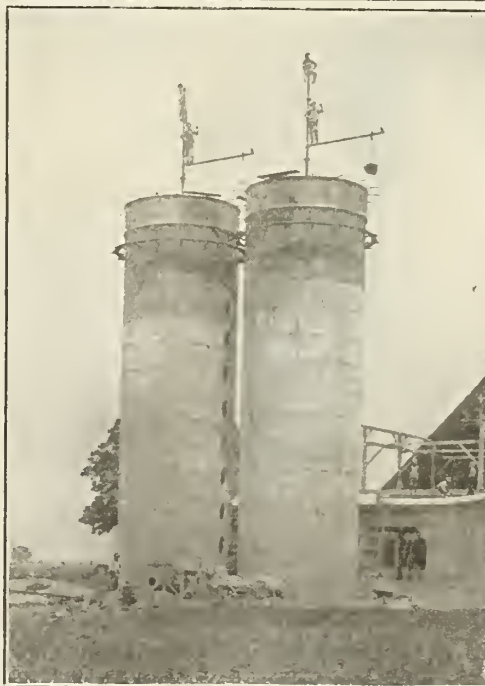
Anti-Damp is still "The Old Reliable" water and damp-proofing. In colors. Gets hard as flint.

Elephant Tread concrete floor finish. In colors. Guaranteed. We are not paint manufacturers. Special attention to above products and to the needs of concrete men. Write us. Others have been made to rejoice.

THE ANTI-STICK CO.

Westerville, Ohio.

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To learn the facts—

To begin to lower that labor cost.

To begin to lower that depreciation percentage.

To begin to increase those profits.

To use the POLK SYSTEM of circular monolithic construction.

DON'T WAIT and continue to waste.

Sit down RIGHT NOW and write us for our claims for the merits of the POLK SYSTEM. You'll be glad you did so when you hear what we have to say. It's the POLK SYSTEM you need.

"It Renders the Service."

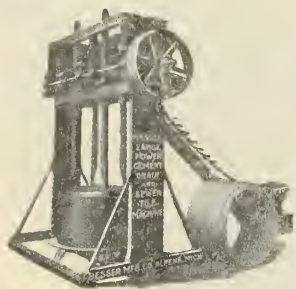
POLK GENUNG POLK CO., Inc.

Fort Branch, Indiana

BESSER

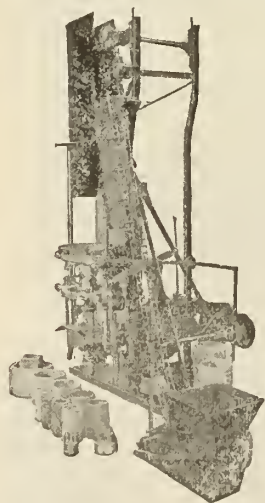
Concrete Machinery

PIPE AND TILE



Besser Large Power Tile Machine

Demand for large concrete pipe is increasing. This power pipe machine molds and tamps automatically concrete pipe, plain or bell end, 8" to 48" in diameter. Tampers may be arranged to tamp concrete block as well. No eccentrics, cranks, chains or sprockets. Ask for Big Tile Machine Catalog.



Besser Regular Power Tile Machine

There is no moving table to jar or jerk on the Regular Besser Power Tile Machine. Packer works from the bottom, mold moving down and up over it. Machine feeds itself from the mixer, saving the man at the material boot. Makes tile 3" to 15".

Ask for Drain Tile Machine Catalog.

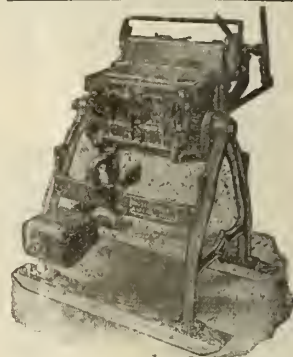
YOU remember the story of the darky who was about to be hanged. Judge asked him if he had anything to say. "Yas," said Sam, "Yas, 'deed I want to say this done goin' to be a good lesson foh me." That same sentiment might be expressed by a whole lot of concrete men when they buy the first piece of machinery that is shown to them.

I may be an ill-natured old pessimist, but of this I am sure—QUALITY pays. The first thing put into Besser machines is QUALITY. I don't care if I don't sell but one machine a week, that machine is going out of this factory spick and span, right side up, in A No. 1 condition. It's GOT to be that way, because I say to the purchaser: "This machine lives up to its press notices—it makes good our claims. If it doesn't work that way for you, let us know. If we can't satisfy you with it, we'll take it back and refund your money."

There are a lot of concrete men who are attracted by low prices. When the cheap machines fail, they find they've lost time and money and trade. **BUY A GOOD MACHINE TO START WITH.** Buy it of a firm which backs up every nut and casting that goes out with a money-back guarantee.

I have written into the Besser catalogs a lot of ideas on tile, brick, block and pipe manufacture that have made our reputation. Get these catalogs. Compare our machines with others. That's all I ask. You can bank on it that when I can't make a machine that I can guarantee, I'm going out of business. And that's a long way off.

BLOCK AND BRICK



Besser Face-Down Block Machine

Only face-down block machine making block of wet mixture at great speed. Only face-down block machine withdrawing cores vertically and automatically. Only face-down block machine turned over by counterweight. Only face-down block machine making a continuous air-space block, tied with metal ties, in addition to regular hollow block.

Ask for Block Machine Catalog.



Besser Power Brick Machine

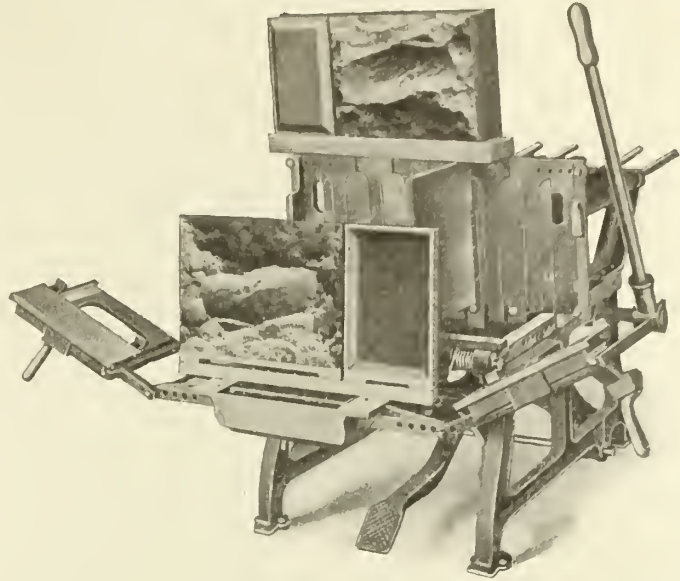
A whole brick plant in itself. Tamps the brick automatically. Feeds itself and carries away its own product. Made with capacity of 20,000 brick per day. Larger type makes 50,000 to 60,000 per day. Reduces cost of brick manufacture to from \$3.50 to \$4.50 per M. Establish a Besser brick plant and get the brick business in your town.

Herman Besser

President.

BESSER MANUFACTURING CO., 106 12th Street, Alpena, Mich.

THE HOBBS set up for making blocks 12 inches high in 4 inch Veneer or two-piece wall. In this view you see how different style face plates can be used at the same time. A 12x8 Panel Faced, and a 12x16 Rock Faced block as made by this set up are shown on top of the machine.



Why a HOBBS Block Machine is the best machine for you to buy

FIRST and foremost, the Hobbs makes the wettest block of any and the oval Hobbs cores make the strongest and the quickest cured block, and we can prove it. Therefore, Hobbs block are hard and waterproof and better still from a selling standpoint they have a remarkable natural rock face that sells the block twice as easily and for more money than those made with old style machines. The best iron plates ever made cannot produce a rock face block one-half so natural or so pleasing as the Hobbs Composition Plates. It will pay you to investigate.

WITH the Hobbs you can make over 2,000 sizes of block—endless variety at your command. You can use iron or wood pallets and set the Hobbs either as a regular 16, 20 or 24-inch machine. You can adjust for any length block from 3 to 24 inches (advancing by inches), any thickness from 3 to 12 inches, any height from 3 to 12 inches, and so accurately are the parts machined that no change takes more than five minutes to complete.

YOU gain a tremendous advantage when you get a Hobbs, for you can make common block cheaper and quality block finer than has ever before been possible. We can prove the Hobbs to be the fastest hand machine made for all style block, and the Hobbs is the only machine that makes fractional block as quickly as whole block. The progress and the experience gained by block men in the last ten years you will find in the Hobbs. It is up-to-date.

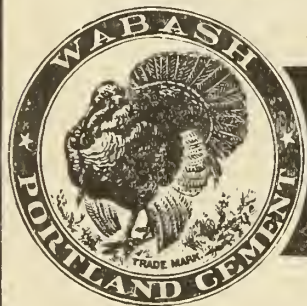
The Hobbs is the best seller today—there is a reason. No block man is content with his old machine after he understands the Hobbs. Better investigate,—The Hobbs is modern, efficient and a money maker. Send for our catalog, it is the first step toward a bigger block business.

THE HOBBS CONCRETE MACHINERY COMPANY

933 Scotten Avenue, - - - Detroit, Mich.



Reinforced Concrete Bridge over the Kalamazoo River at Kalamazoo, Michigan. Length of bridge, 180 feet; width, 38 feet. 5,500 barrels of Peninsular Portland Cement used in the construction of this bridge.



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PORTLAND CEMENT**

Great Strength, Durability, Fine Color.

Best for Sidewalks, Foundations, Floors, Walls, Concrete Blocks, Bridges, etc.

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It is exceptionally uniform in color.

It is ground fine—over 96% passes a 100 mesh sieve.

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It is made in large quantities—on good railway connections—insuring prompt shipments.



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Northwestern Prices**

When you are in the market for cement give us a chance to figure with you. Our cement has great strength—you should use it, and if you will write us we are sure we can get together.

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